AN INVESTIGATION OF FOOD CHOICE BEHAVIOUR
AND DIETARY INTAKE OF CHILDREN, TEENAGERS
AND ADULTS WITH FOOD ALLERGIES

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Abstract

Food allergies in children, teenagers and adults are managed by eliminating the allergenic food from the diet. Healthcare professionals and policy makers have developed guidelines for the dietary management of food allergies, but as yet there has been no assessment of how individuals with food allergies are able to adapt their behaviour to them. In order to be able to improve the diet and nutrition of children, teenagers and adults with food allergies, and thereby to increase their quality of life, it needs to be understood which processes influence food choices and management of food and eating in this population, and how their actual diet is affected by the chronic condition.

This research consisted of four stages, the first three addressing food choice behaviour among age groups of children, teenagers and adults; the fourth stage evaluating the impact of food allergies on nutrient intakes of this population. A mixed-method approach has guided this research.

The findings indicate that food choice behaviour is mostly affected by food allergies in adults. This is probably because personal cognitive factors play a more dominant role during food choice decisions than during childhood and adolescence, where social influences are more prevalent. Adults reported a lack of satisfaction and joy from food, had difficulties sharing meals, and felt the need to organise their eating. Teenagers struggled to widen their palate, felt secure under parental protection, and expressed the wish to eat similar foods to their friends. Children showed highest engagement with foods if the mother displayed an authoritative parenting style. Although they appeared least affected by the allergic condition in the way they were choosing food, children have been shown to be the age group making most nutritional compromises. Protein, vitamin B12, potassium, calcium, phosphorus, and iodine...
intakes were lower than among healthy age-matched children.

This research has provided a cross-sectional survey of food choice behaviour and dietary intake among food-allergic children, teenagers and adults with many implications for practice and future research. It is recommended that dietary management of food allergies should place emphasis on dietary variety and enjoyment aspects of eating as well as the importance of social relationships that are built around food. Additionally, regular evaluations of dietary intake should be conducted, in particular for children with a cow’s milk allergy or individuals with multiple food allergies.
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Declaration

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

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Abbreviations

TRA - Theory of reasoned action
TBP - Theory of planned behaviour
SCT - Social cognitive theory
NDNS - National Diet and Nutrition Survey
SPT - Skin prick test
MBRS - Maternal Behaviour Rating Scale
CBRS - Child Behaviour Rating Scale
FFQ - Food frequency questionnaire
PAL - Physical activity level
BMR - Basal metabolic rate
BMI - Body mass index
EAR - Estimated average requirements
RNI - Reference nutrient intakes
MANCOVA - Multivariate analysis of covariance
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Dedication

I would like to dedicate this thesis to my parents as a small symbol of my gratitude for their unconditional love and support throughout my life.

Dissemination

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Poster Presentations:


Chapter 1

Introduction

People must purchase, choose, prepare and eat food in order to survive. Eating does not only
fulfil biological needs, it is also a representation of relationships and interactions among the
individuals, their culture, and the society in which they live (Axelson 1986). Although not
always aware of it, the average person makes more than 200 food choice decisions every
day (Wansink & Sobal 2007). These food choice decisions are influenced by a number of
interrelating factors. One of these factors could be a chronic condition such as a food allergy,
where avoiding the offending food is the cornerstone of its management (Boyce, Assa’ad,
Burks, Jones, Sampson, Wood, ... & NIAID-Sponsored Expert Panel 2010). Food allergies
affect all age groups and given that consuming allergenic food is potentially life-threatening,
they are likely to have an impact on the food choice behaviour and dietary quality of those
who suffer from them.

The opening chapter of this PhD thesis reviews the literature relevant to food choice
behaviour and food allergies in order to establish a context for the research questions. It
introduces the concept of food choice behaviour and discusses important determinants
and developmental issues around food and eating. This is followed by a description and
examination of selected models for studying food choice behaviour. The next section
provides some background information on food allergies and reviews current dietary
management and its nutritional implications. The literature review highlights the importance
of investigating food choice behaviour and dietary intake, but the literature specific to the
individual studies of this research is presented in their respective chapters. The overall aim
of this research is to understand influences on food choice behaviour and evaluate dietary quality of the food-allergic population. This is achieved by using a mixed-method approach.

The following chapters describe the four studies undertaken as part of this research, whereby the first three addressed food choice behaviour in adults, teenagers and children with food allergies, and the fourth evaluated their dietary quality. Chapter 2 presents a qualitative study investigating the effect of food allergies on influences of food choice behaviour in adults. Qualitative research is particularly suitable for exploring a situation or behaviour within healthcare research (Pope & Mays 1995). Underpinned by a theoretical model on food choice behaviour, the attitudes, behaviour, beliefs and experiences informing food choice decisions of adults with food allergies were investigated using focus groups. The findings were contrasted with the general population in order to highlight differences between the two groups.

Chapter 3 describes a similar study to Chapter 2, but the impact of food allergies on food choice behaviour was studied on teenagers with food allergies. For developmental and practical considerations, the attitudes, behaviours, beliefs and experiences that shape the way teenagers choose their food was examined by individual in-depth interviews. Data was analysed under the theoretical concept of food choice behaviour among teenagers and compared to teenagers without food allergies.

Chapter 4 introduces a novel developmental approach for studying mother-child interaction as part of a pilot study. This approach involved observations of mother-child dyads during a board game play consisting of food shopping and classification. With the use of qualitative rating scales for maternal and child behaviours, general socialisation outcomes and maternal parenting styles were determined. The results were explored for potential behavioural patterns associated with food allergies, which is an important aspect in terms of future food choice behavioural development of the child. At the end, an example of a normative relationship where a mother and a child with food allergies both score high on socialisation outcomes is presented. Since this was a pilot study, methodological issues of
the board game and its applicability in future studies are then highlighted.

Food choice behaviour is a predictor for food consumption patterns, which in turn are closely associated with the outcome of food choice behaviour - i.e. dietary nutrient intake. Thus, the study presented in Chapter 5 investigated the nutritional impact of food allergies on children, teenagers and adults by collecting information on their actual dietary intake over four days. The results from this dietary survey were interpreted using UK dietary reference values and nutrient intakes from the general population in order to identify at-risk nutrients for individual age groups with food allergies.

Finally, Chapter 6 discusses the overall findings of this research by combining the results of the four studies and discussing them in the context of relevant literature. It readdresses the principal aims for this research: to obtain a full understanding of the influences on food choice behaviour within the food-allergic population and to evaluate their dietary quality. Considerations related to the study population as well as methodological and theoretical issues of this research are presented and the implications of this work for practice and future research are outlined.
Chapter 2

Literature review

2.1 Overview

This literature review intends to give an overview of the key aspects of the two fields of inquiry: food choice behaviour and food allergies. The first section defines food choice behaviour and gives broad context to influential perspectives on the multiple determinants of food choice behaviour. This is followed by an insight into developmental issues surrounding food and eating from early childhood through to adolescence. Selected theories that have found wide application in food choice behaviour research and their key concepts are then presented together with a brief discussion about their use in this area.

The second section introduces the area of food allergies by examining their epidemiology, symptoms, diagnosis and treatment. It proceeds with a more detailed description of current-state-of-art in dietary food allergy management and highlights nutritional considerations for individual food allergies.

The final section outlines aims and approach of this research. Due to the diversity of the sample studied and the interdisciplinary approach used, this literature review is not designed to provide a comprehensive account of existing literature on food choice behaviour and dietary intake of children, teenagers and adults with food allergies. The reader is referred to the chapters addressing the individual studies within this document.
2.2 Food choice behaviour

2.2.1 Definition of food choice behaviour

Food and eating are part of our every day life. Although its primary function is to fulfill biological needs, food plays an important role in many activities in our lives that are unrelated to nutrition (Rozin 2006). Food choice has become a central part of symbolic, economic and social aspects of life by conveying information concerning preferences, identities and cultural meanings (Sobal, Bisogni, Devine & Jastran 2006). One of the earliest studies in food choice behaviour research was conducted by Kurt Lewin who led pioneering investigations trying to answer the question Why do we eat? In his ‘channel theory’, he described food behaviour as a complex process determined by cultural, psychological, biological and economic channels through which foods come to the table (Lewin 1943).

The manifold nature of this behaviour has attracted interest from many fields of expertise, all of which attempt to find an answer to at least parts of the question: “Why does who eat what, when, and where?”. Disciplines contributing to the discussion about food include biology, physiology, psychology, sociology, economics, consumer research, food science to name a few. Each discipline will tackle the question in their own right (Köster 2009). The mere fact that so many disciplines address the issue of food choice behaviour demonstrates its complexity but also its importance (Falk, Bisogni & Sobal 1996). Thus, food choice behaviour can only be understood by taking various theoretical and methodological approaches and as yet, no standard definition for it exists.

2.2.2 Dimensions of influences on food choices

Derived from various disciplines, the determinants of food choice behaviour can also be grouped into different categories. In the following section, a brief overview of the major determinants on food choice behaviour is given.
2.2.2.1 Biological determinants

Obtaining food is central for survival and consequently biological determinants are expected to play a significant role in the food selection process. From a biological perspective, there are several factors that all humans have in common such as the regulation of energy intake and the preferences for certain tastes (Rozin 2006). Humans initiate eating in response to signals reflecting the depletion of energy stores below some critical level, and they terminate it when receiving signals of satiety. Signals of satiety are generated when food is detected, ingested and absorbed. The metabolic state of the body is regulated by the central nervous system, which stimulates and hinders appetite and food intake. Although energy regulation is modulated after each meal to maintain energy stores, it is more likely to act over longer intervals such as days or weeks. The gastrointestinal and central nervous system pathways governing energy homeostasis have turned out to be an important area of research, particularly with respect to obesity treatment (Cummings & Overduin 2007, Woods, Seeley, Porte & Schwartz 1998).

Most people believe that taste is the main driver for their food choices (Glanz, Basil, Maibach, Goldberg & Snyder 1998, Streptoe & Pollard 1995). Indeed, there appears to be a biological disposition to certain tastes. Humans do have an innate preference for liking sweet and salty tastes and an aversion for sour and bitter tastes (Mennella, Pepino & Reed 2005, Wardle & Cooke 2008), but individuals differ genetically in their degree of perceiving these tastes (Drewnowski, Henderson, Levine & Hann 1999, Drewnowski, Henderson & Barratt-Fornell 2001). It has also been demonstrated that humans have a preference for high energy dense foods (Zandstra & El-Deredy 2011), which is assumed to be acquired and not innate because fat imparts different characteristic textures to different foods (Nestle, Wing, Birch, DiSogra, Drewnowski, Middleton & ... Economos 1998). Most of our food preferences result from an interaction of genetic and experiential factors, with ‘learning’ playing a critical role (Birch 1999). ‘Liking’ or palatability, referring to the hedonic evaluation of sensory factors such as taste, smell, texture and appearance of a food (Mela 2006) is therefore predominately an individual characteristic that can be learnt.
2.2.2.2 Psychological determinants

Emotions, motives and attitudes are the main traditional psychological factors influencing food choice behaviour (Gedrich 2003). The relation between food choice and emotional status is reciprocal. Foods can either be chosen for the purpose of enhancing the current emotional state, e.g. lifting of mood, or calming of stressed ‘nerves’; or food preferences can equally be a result of the current emotional state, e.g. increased intake of sweet, high-fat foods. Additionally, emotions of high arousal or intensity, especially negative ones, can suppress appetite and food intake in some people, e.g. decreased appetite when stressed (Babicz-Zielińska 2006). Macht (2008) has identified three types of eaters, each responding differently in their eating habits to emotional states of high arousal or intensity. Restrained eaters demonstrate enhanced food intake when subjected to any emotions, negative or positive ones, due to impairment of cognitive eating control. Emotional eaters tend to regulate their negative emotions by eating sweet and high-fat foods. In normal eaters, emotions affect eating in congruence with their cognitive and emotional characteristics. This highlights the role of individual differences in predicting how emotions affect eating habits.

Motives are emotions, wishes or physiological needs that act as incitements to a behaviour (Gedrich 2003, Babicz-Zielińska 2006). There are a number of motives that work together during food choice decisions including hedonistic values of foods, maintaining health or well-being, keeping weight down, saving money, convenience of eating and food preparation, familiarity, ethical concern, affiliation to a social group and representing social status (Streptoe & Pollard 1995, Fotopoulos, Krystallis, Vassallo & Pagiaslis 2009). Although there might be rational motives for a certain food choice behaviour, e.g. the desire to be healthy, they do not always result in proper eating habits (Babicz-Zielińska 2006).

Closely linked to the concept of motives are attitudes. Attitude refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question. Attitude is, amongst other factors, predicted by the combination of motives (Ajzen 1991). Attitude research is widely applied to identify attitudes towards healthy eating (Sun 2008) and food products (Roininen, Lähteenmäki & Tuorila 1999). It aims
to shed light upon the rational cognitive processes which influence food choice behaviour (Connor 1993). Both food motives and food/health attitudes are considered to have a mediating role among the effects of biology on behaviour (Connor & Armitage 2006, Sun 2008). They are shaped on the basis of cultural values and have been shown to differ across countries (Rozin, Fischler, Imada, Sarubin & Wrzesniewski 1999, Prescott & Wathes 2002). Other psychosocial factors contributing to the understanding of consumer and food choice behaviour include perception, thinking, learning, values, beliefs, intentions and involvement (Gedrich 2003).

2.2.2.3 Socio-cultural determinants

Social environments and cultural practices are powerful influences on the individual’s food choice behaviour. The cultural background is perhaps the best indicator for food preferences and choice as it determines what might appear on the plate and when. Thus, the culture provides the foundation for rules of cuisine and appropriateness of food that have been developed within a unique combination of environment, ritual and belief systems, community and family structure, human endeavour, mobility, plus economic and political systems (Mela 1999). There are not only differences with respect to cuisine and food, but also in terms of what constitutes an appropriate meal, the order of serving, table manners, the social organisation of a meal, food and ritual, the meaning of food in life and social intercourse (Rozin 2006). The culture consequently shapes ideals, identities and roles involved in the concept of food choices (Devine, Sobal, Bisogni & Connors 1999). For example, the French value the pleasurable and social aspects of eating, plus certain food quality issues as well as health. The English are more likely to consider convenience and organicethical issues surrounding food as important factors that influence their food choices (Pettinger, Holdsworth & Gerber 2004). Similarly, women tend to make healthier food choices than men due to greater concern about physical appearance and stronger beliefs in healthy eating (Wardle, Haase, Steptoe, Nillapun, Jonwutiwes & Bellisle 2004), and older people are more inclined to base food choice decisions on health considerations than the younger generation (Chambers, Lobb, Butler & Traill 2008).
Food constitutes a binding agent that is able to make connections across geographical and symbolic boundaries (Debevec & Tivadar 2006). Most eating takes place in the company of others, although meals do not always involve eating with others and certain eating occasions, such as breakfast, may be solitary affairs (Sobal & Nelson 2003). Shared eating satisfies a need for interaction and reinforces social ties (Simmel 1949). Eating relationships are established with families, groups, networks, organisations, communities and other social units (Sobal et al. 2006). Social modelling plays an important role within families where children’s diets are affected by the types of food eaten by their parents, and their eating-related attitudes show similarities (Brown & Ogden 2004). On the other hand, teenagers gradually gain control over their food choices and mostly adopt eating habits from their peers (Contento, Williams, Michela & Franklin 2006). The presence of other people during meals also influences food consumption. This phenomenon is referred to as social facilitation (De Castro 1997). Research has shown that people tend to eat bigger meals and larger amounts of food when they are with other people (De Castro 1990). Another concept related to meal sharing is commensality, which describes how eating partners are selected and excluded. Within a commensal unit such as family, friends, work colleagues or neighbours, individual food choices are negotiated or managed in conjunction with others. These commensalities also provide a social structure for everyday life (Sobal & Nelson 2003).

2.2.2.4 Economic and environmental determinants

Economic factors including food prices, income, knowledge and time are also important determinants of food choices with direct consequences for nutrient availability. Food prices, as can be expected, affect groups of lower socio-economic status more than others, particularly the unemployed and retired (Lennernäs, Fjellström, Becker, Giachetti, Schmitt, Remaut de Winter & Kearney 1997). Research has shown that lower socio-economic status and poverty are strong predictors of unhealthy eating habits (Shelton 2005). In fact, nutritionally adequate diets, as recommended by the guidelines, can be promoted to middle- and upper-income women, but may be difficult to be adopted by women on a low food budget (Darmon, Ferguson & Briend 2006). Price reductions have also proven to be an
effective strategy to increase the purchase of more healthful foods in community-based settings such as work sites and schools (French 2003).

Nevertheless, even though a higher intake of fruit and vegetables is associated with higher diet costs, the relationship between diet quality and diet cost seems to be more complex (Drewnowski & Darmon 2005, Daborn, Dibsall & Lambert 2005). In a study by Dibsdall, Lambert, Bobbin & Frewer (2003), the majority of people with lower incomes believed that they were following a healthy diet and that money was not a barrier to such a diet. For others, food and healthy eating tends to have a low priority compared to other aspects of their life (Dibsdall, Lambert & Frewer 2002). This indicates that nutrition knowledge and education, which also relate to food preparation skills, are major determinants of eating habits.

Time scarcity is another important consideration regarding food choices. Time is required for information gathering, food shopping and preparation (Blaylock, Smallwood, Kassel, Jam & Aldrich 1999). Increasing family work hours give rise to fewer family meals prepared or eaten at home and an increase in the consumption of fast foods and convenience foods (Devine, Jastran, Jabs, Wethington, Farell & Bisogni 2006). Trends do not only show a decrease in the length of time that is allocated to preparing foods, but also an expansion of drinking and eating out, particularly among more affluent people (Cheng, Olsen, Southerton & Warde 2007).

Environmental influences on food choices refer, if narrowly interpreted, to the physical and built environment in which food choices are made. Within a community, foods are made available at restaurants, businesses, schools, grocery stores, community centres and worksites (Nestle et al. 1998). Although the actual choice of food is expansive and readily accessible to the consumer in Western societies, there are still large fluctuations in food supply due to seasonal changes or geographical dispersion (Mela 1999). So-called ‘food deserts’, i.e. poor communities, where residents cannot buy affordable healthy food, are believed to be important geographical contributors to unhealthy diets, although controversies
in the literature exist (Pearson, Russell, Campbell & Barker 2005, Hendrickson, Smith & Eikenberry 2006). Store accessibility to buy fruit and vegetables could play a major role for some disadvantaged consumers who do not have access to a car (Wiig & Smith 2009).

2.2.3 Developmental issues in food choice behaviour

Genetic predispositions to prefer sweet and salty tastes and to reject bitter and sour foods are believed to have evolved to serve a protective function, by distinguishing edible (often signalled by the sweet taste) from inedible foods (signalled by bitter and sour tastes) (Rozin 1990). Alternatively, children’s acceptance of foods that have less intrinsic hedonic appeal is merely learned via experience with food and eating. Children develop likings and dislikings for foods by associating sensory cues of foods with the context and consequences of eating certain foods (Birch 1999, Savage, Fisher & Birch 2007, Wardle & Cooke 2008). Young children also have the tendency to be initially neophobic about food, particularly in the second year of life when the transition to an adult diet takes place (Scaglioni, Salvioni & Galimberti 2008). Neophobia can be a formidable barrier to maintaining a varied diet necessary to support adequate growth and health; studies indicate that food variety seeking is a stable food behaviour (Skinner, Carruth, Wendy & Ziegler 2002) that is tracked into adulthood (Nicklaus, Boggio, Chabanet & Issanchou 2005). Fortunately, there is a large body of literature suggesting that neophobia can be reduced by repeated exposure to those foods in a non-coercive setting (Cooke 2007 for review). Children’s acceptance for new foods might require 10 or more daily exposures (Wardle, Cooke, Gibson, Sapochnik, Sheiham & Lawson 2003a, Wardle, Herrera, Cooke & Gibson 2003b).

The acquisition of food acceptance patterns through environmental cues and mere exposure implies that children’s food preferences and eating habits are largely a result of the foods that they have become familiar with. Familiarity is attained through accessibility and availability of certain foods. Several studies have shown that children and teenagers are more likely to consume fruit and vegetables if they are readily available in the home (Cullen, Baranowski, Owens, Marsh, Rittenberry & de Moor 2003, Hanson, Neumark-Sztainer, Eisenberg, Story & Wall 2005, Campbell, Crawford & Hesketh 2007, Larson, Laska, Story
& Neumark-Sztainer 2012). It can be reasoned that the children’s diet is to some extent a reflection of their parent’s diet as parents tend to have food in the home that they like and eat (Birch 1990).

Parents do not only influence their children’s food preferences through the foods they make available. In general, they play a key role in the development of children’s eating habits as they ultimately determine the child’s physical and social environment and act as socialisation agents who influence behaviours, habits, and attitudes (Ritchie, Welk, Styne, Gerstein & Crawford 2005). Results of research on family behaviour patterns show similarities between parents’ and children’s eating behaviours. This includes, for example, food preferences (Skinner et al. 2002), snacking habits, eating motivations and body dissatisfaction (Brown & Ogden 2004, Holsten, Deatrick, Kumanyika, Pinto-Martin & Compher 2012). Parents also shape the development of children’s eating behaviours by their behaviour at mealtimes and use of specific feeding styles and practices (Scaglioni et al. 2008). Their attempt to control the type and amount of foods children select and prefer may have an effect on children’s food preferences and their ability to self-regulate food intake (Birch & Fisher 1998). Restricting children’s access to sweets and fatty snacks can increase their desire to obtain and consume those foods (Fisher & Birch 1999, Faith, Scanlon, Birch, Francis & Sherry 2004), and pressure to eat fruit and vegetables may lead to a decrease in their consumption (Fisher, Mitchell, Smiciklas-Wright & Birch 2002, Wardle, Carnell & Cooke 2005, Zeinstra, Koelen, Kok, van der Laan & de Graaf 2010). Although still widely disputed (Ritchie et al. 2005, Savage et al. 2007, Ventura & Birch 2008, Scaglioni et al. 2008, Powell, Farrow & Meyer 2011), there is growing evidence that an authoritative parenting style, where parents demonstrate warmth and involvement, emotional support, appropriate granting of autonomy, and clear, bidirectional communication, promotes favourable dietary intake and weight status in both children and teenagers (Kremers, Brug, de Vries & Engels 2003, Patrick, Nicklas, Hughes & Morales 2005b, Moens, Braet & Soetens 2007, van der Horst, Kremers, Ferreira, Singh, Oenema & Brug 2007, Pearson, Atkin, Biddle, Gorely & Edwardson 2010a). Parents perceptions and attitudes towards food as well as their approach to feeding their children are guided by socio-cultural beliefs, values and norms and highly

As childhood progresses, parental influence diminishes and children start to gain more control and autonomy over their food choice (Bassett, Chapman & Beagan 2008a, Warren, Parry, Lynch & Murphy 2008, Fitzgerald, Heary, Nixon & Kelly 2010). Peers become increasingly important and their social norms and attitudes towards food impact food preferences and patterns (Dennison & Shepherd 1995, Contento et al. 2006). Peer influence also has an effect on body image and weight stigma, and negative friendship qualities have been linked to dieting behaviour among teenagers, particularly in girls (Gerner & Wilson 2005, Schutz & Paxton 2007). The dieting trend is predominately fostered by sociocultural pressures on women to be thin (Birch & Fisher 1998).

Another determinant of children’s eating habits is the television. Television viewing is a powerful tool with which to influence children’s and teenagers’ eating behaviour as it constitutes a platform for conveying nutrition messages and advertisement of food products (Ray & Klesges 1993). This is of special concern with respect to the nutritional content and quality of the foods being advertised (Hill 2002), and indeed, it has recently been shown that children in the UK are exposed to more TV advertising for unhealthy than healthy food items, despite regulations (Boyland, Harrold, Kirkham & Halford 2011). Several studies have demonstrated associations between television viewing and unhealthy consumption patterns and increased calorie intake in children and teenagers (Vereecken, Todd, Roberts, Mulvihill & Maes 2006, Pearson & Biddle 2011, Rey-López, Tomás, Vicente-Rodríguez, Gracia-Marco, Jiménez-Pavón, Pérez-Llamas, ... & AVENA Study Group 2011). Television viewing has not only been found to stimulate consumption and purchase of food advertised during commercials (Fiates, Amboni & Teixeira 2008), but also to affect meal structure (Van den Bulck & Eggermont 2006).

Aside from the media, the child’s physical environment can have a large impact on children and teenagers’ food choices and intake. Children spend a substantial amount of
time outside their home and consequently their food and meals are routinely provided
by someone other than a parent such as caregivers, nurseries and school canteens. The
importance of healthy school meals is nowadays beyond dispute, and nutritional and
food-based standards have been introduced across UK schools in 2001 (Evans & Harper
2009). In fact, children taking packed lunches to school have been found to have worse diets
than those having school meals (Evans, Cleghorn, Greenwood & Cade 2010). Even though
the dietary quality of school lunches has been improved, fast-food restaurants, vending
machines and convenience stores selling snacks hold great appeal for the young population
(Story, Neumark-Sztainer & French 2002).

2.2.4 Approaches to study food choice behaviour

There are a variety of approaches to study the understanding of food choice behaviour re-
sulting from the various disciplines involved. Each discipline brings with it its own set of is-
sues and methodological perspectives. In order to convey a sense of the different approaches
taken, a brief overview of selected theories and models about food choice behaviour from a
socio psychological and socio ecological perspective is provided. These theories and mod-
els provide a framework for individual and environmental determinants of food choice be-
aviour respectively. Subsequent to these, multi-level frameworks of food choice behaviour
integrating both perspectives are presented. It should be noted that most of these theories and
models have been developed in Western societies and may require considerable adaptation
with respect to cultural issues and concerns to serve well in other contexts.

2.2.4.1 Social psychological models

Social psychological models focus on the rational and cognitive influences underlying beh-
avioural decision-making. A cognitive approach to food choice emphasises the importance
of an individual’s cognitions in predicting and regulating behaviour, although behaviours
are thought to be influenced by a number of factors. Thus, most models incorporate other
components such as attitude to a given behaviour, risk perception, perceptions of severity of
the problem, the costs and benefits of a given behaviour, self-efficacy, past behaviour and
social norms (Ogden 2010). The two main models used to conceptualise influences on food
choice behaviour are the theory of reasoned action and its successor the theory of planned behaviour, and social cognitive theory.


The theory of reasoned action (TRA) states that individual performance of a given behaviour is primarily determined by a conscious intention to perform the behaviour, and intention is predicted by attitude and subjective norms (Figure 2.1) (Ajzen & Fishbein 1980). Behaviour intention is defined as the motivation required to perform a behaviour: the stronger the intention of performing a behaviour, the more likely will be its performance (Fishbein & Ajzen 1975). Attitude represents a summary evaluation of a psychological object captured in such attribute dimensions as good-bad, harmful-beneficial, pleasant-unpleasant and likable-dislikable (Ajzen 2001). Subjective norm is defined as perceptions of social pressure to perform a behaviour. These factors are again influenced by beliefs: beliefs about the outcome of the behaviour in the case of attitudes, and beliefs about what other people think the person should do in the case of subjective norm (Ajzen & Fishbein 1980, Shepherd 2008).

![Schematic representation of the theory of reasoned action](image)

Figure 2.1: Schematic representation of the theory of reasoned action. Source: Ajzen & Fishbein (1980)

Facing criticism that the theory would only deal with ‘pure volitional behaviours’, which are simple behaviours that are solely dependent on the formation of an intention, Ajzen (1991) extended the TRA to the Theory of Planned Behaviour (TPB). TPB adds the concept of perceived control over the opportunities, resources and skills necessary to perform a behaviour.
Figure 2.2: Schematic representation of the theory of planned behaviour. Source: Ajzen (1991)

(Figure 2.2). Perceived behavioural control refers to people’s perception of the ease or difficulty of performing the behaviour of interest. It predicts intention and can also have a direct impact on behaviour. As with attitude and subjective norm, perceived behavioural control also is influenced by beliefs (Ajzen 1991, Shepherd 2008).

**Social Cognitive Theory (Bandura 1986)**

Social Cognitive Theory (SCT) explains behaviour by a reciprocal model in which environmental influences, personal factors and behaviour continually interact. It is an approach that emphasises the role of social modelling, where people learn not only through their own experiences, but also by observing the actions of others and the results of those actions. According to SCT, human motivation and action are extensively regulated by forethought (Bandura 1986). A number of key constructs are important for understanding food choice behaviour including personal characteristics (e.g. demographics, personality), emotional arousal, behavioural capacity (knowledge and skills), self-efficacy (individual’s confidence in his or her ability to perform a behaviour in various situations), expectation/expectancies (anticipated outcome of a behaviour), self-regulation, observational learning, and reinforcement (consequences that affect the probability a behaviour will be tried again) (Redding, Rossi, Rossi, Velicer & Prochaska 2000). Reciprocal determinism constitutes a principle of SCT. This means that a person can be both an agent for change and a responder to change. In other words, the environment shapes, maintains and constrains behaviour, but people can play an
Active role in it (Glanz & Bishop 2010).

**Application of socio psychological models in food choice behaviour research**

There have been several applications of social psychological models to predict both specific and more general food choices. For example, the TRA has been used to predict fat intake (Shepherd & Towler 1992) and to examine the extent to which cognitions relate to the intentions of following a healthy diet conceptualised as a diet low in fat and rich in fibre (Barker, Thompson & McClean 1995). More often studies have applied the TPB to determine fish consumption (Verbeke & Vackier 2005), skimmed milk (Raats, Shepherd & Sparks 1995), adolescent food choice behaviour (Dennison & Shepherd 1995, Bissonnette & Contenko 2001, Lytle, Varnell, Murray, Story, Perry, Birnbaum & Kubik 2003), and more recently organic food purchase (Arvola, Vassallo, Dean, Lampila, Saba, Lähteenmäki & Shepherd 2008). Social cognitive theory has primarily been used to predict food choices in older children and teenagers (Resnicow, Davis-Hearn, Smith, Baranowski, Lin, Baranowski, ... & Wang 1997, Cusatis & Shannon 1996, Cullen, Baranowski, Rittenberry & Olvera 2000). Despite its wide use, social psychological models have been questioned for being an appropriate measure in predicting food choice. Even though people have intentions to perform a behaviour, it does not mean that the behaviour is performed per se. This specifically concerns more global dietary behaviours (e.g fat intake), whereas relatively clearly defined behaviours (e.g. fruit and vegetable consumption) are predicted reasonably well. Another
argument is that a cognitive approach assumes that behaviour results from a rational thought and does not consider the affective component of behaviours as well as those behaviours that are more habitual. Additionally, attitudes towards behaviours might be multidimensional and not simply positive or negative. This issue could stem from the fact that quantitative methods and devised questionnaires rather than qualitative methods are most frequently applied. And finally, while external social influences are recognised in the form of subjective norm (TRA, TBP) and observational learning (SCT) in these models, they do not provide the context in which the behaviour takes place (Connor & Armitage 2006, Shepherd 2008, Ogden 2010).

2.2.4.2 Social ecological models

In recent years, there has been growing interest in, and application of, socio ecological models in food choice behaviour research, mainly due to the rising prevalence of obesity and the need thereof, to better understand people’s relationships to their environments. This has come along with a shift in emphasis from individually orientated to environmentally based analysis of health behaviour (Stokols 1996). The socio ecological model recognises the interwoven relationship between individuals and their environment and posits that behaviour has multiple levels of influences including intrapersonal (biological, psychological), interpersonal (social, cultural), organisational, community, physical environmental and policy (Sallis, Owen & Fisher 2008). The most influential model in social ecology is Bronfenbrenner’s ecological system theory, which has also provided the foundation for subsequent ecological models.

Ecological System Theory (Bronfenbrenner, 1979, 1986, 1994)

Bronfenbrenner’s ecological system theory is based on the principle that human development can only be understood within the ecological system in which growth occurs. The ecological system encompasses several levels of environment that either influences a child or is influenced by the developing child. A key concept is the reciprocal interaction around the child and the components of the different systems, which are persons, objects and symbols in its immediate environment. Bronfenbrenner conceives the environment as a set of nested structures moving from the innermost microsystems to mesosystems to exosystems to finally the
outside macrosystems (Figure 2.4). The microsystem is the principal setting in which child development takes place. This is where the child experiences most activities, social roles and interpersonal relations with the people and institutions around it such as teachers, parents and peer group. The mesosystem refers to the relationships occurring between different parts of the microsystems, for example linkages among family, school and friends. The exosystem consists of settings in which the child is not directly involved in, but events occur that indirectly influence the immediate setting in which the child lives, such as a parent’s work. The macrosystem constitutes the overarching pattern of all systems characteristic of a given culture, referring to the belief systems, customs and lifestyles of a society. Bronfenbrenner extended the model to the chronosystem which incorporates changes or consistency over time (Bronfenbrenner 1979, 1986, 1994).

**Applications of socio ecological models in food choice behaviour research**

Socio ecological models are believed to provide comprehensive frameworks for understanding the multiple and interacting determinants of food choice behaviours, particularly among
children. Although not a longstanding tradition, socio ecological models have been used to predict environmental influences on food choice among schoolchildren (Bauer, Yang & Austin 2004, Brown & Landry-Meyer 2007), childcare providers’ food and mealtime decisions (Lynch & Batal 2011), barriers to fruit and vegetable intake (Robinson 2008), and childhood overweight (Davison & Birch 2001). They have been recommended for application in understanding the nutrition environment (Glanz, Sallis, Saelens & Frank 2005), obesity (Egger & Swinburn 1997) and health promotion research (Economos & Irish-Hauser 2007, Sallis et al. 2008).

Socio ecological models contrast social psychological models in that they aim to identify broader levels of influence rather than specific variables, and their underlying mechanisms by which they are thought to affect behaviour. Therefore, these models have been criticised for their lack of specificity about critical influences important for behavioural change and their vagueness in how influences across different systems interact. Another weakness is that research based on socio ecological models is more demanding and expensive than individual behavioural research. Finally, socio ecological models have been viewed as shifting the individual responsibility to the society level (Sallis et al. 2008).

2.2.4.3 Multi-level frameworks of food choice behaviour

There is no doubt that food choice behaviour is determined by both individual and environmental factors. In an effort to combine existing socio psychological and socio ecological theory, comprehensive frameworks and models specifically designed to explain food choice behaviour have been developed over the recent years (Shepherd 1985, Furst, Connors, Bisogni, Sobal & Falk 1996, Devine, Connors, Bisogni & Sobal 1998, Nestle et al. 1998, Krebs-Smith & Kantor 2001, Wetter, Goldberg, King, Sigman-Grant, Baer, Crayton, ... & Warland 2001, Story et al. 2002, Livingstone, Robson & Wallace 2004, Contento 2007, Sobal & Bisogni 2009). These models differ in the way they have been generated, deductively or inductively, and their complexity of understanding food choice behaviour. Some have been designed for specific populations or food groups, while others aim to conceptualise overall food consumption. However, they are all trying to integrate factors related to
the food itself, to the individual and to the environment in which the food choice is made. The two models relevant to this research are presented here.

**Food choice process model (Sobal & Bisogni 2009)**

The food choice process model has been inductively developed by Furst et al. (1996) seeking to provide a wholistic perspective of the factors influencing the way people construct food choices. It has been verified (Falk et al. 1996) and elaborated (Bisogni, Falk, Madore, Blake, Jastran, Sobal & Devine 2007, Devine et al. 1998, Connors, Bisogni & Devine 2001) later on with the intention to shift the focus to the food construction process (Sobal & Bisogni 2009). The food choice process model consists of three major components that operate together when people construct food choices: life course, influences and personal system (Figure 2.5).

The life course embeds food choice decisions within the context of time and accounts for people’s life course experiences and events they had prior to current food choice decisions. It does not only refer to developmental aspects of life but also to different life course stages including food trajectories (persistent thoughts, feelings, strategies and actions over the life span), transitions/turning points (a shift in a person’s life that leads to changes or continuation of dietary behaviour), timing (when transition or turning points occur), and contexts (environments in which life course changes take place).

The life course forms the foundation for the operation of influences shaping food choice decisions. These influences fluctuate over time, interact with each other, and impinge on the personal food system where food choices are constructed. They are grouped into five categories: ideals, personal factors, resources, social factors and contexts. Ideals are the standards people use as reference points to evaluate food choices. They are culturally learned and reflect the concept of food and eating that people have, for example ideals about adequate meals, appropriate manners and health. Personal factors represent individual characteristics informing food choice decisions and behaviours. They involve physiological (e.g. genetic, sensory), psychological or emotional (e.g. preferences, personality, mood), and social (e.g. gender roles, identity) characteristics. Resources are the tangible and intangible capital people have for making food choices. Tangible capital refers to physical
assets including income and equipment, whereas time, skill and knowledge are considered intangible capital. People’s food choices are also influenced by social factors which are the relationships and social roles built around food and eating, for example families, groups, networks, communities and organisations. These can either constrain or facilitate food choice decisions. And contexts are the broader physical and social environments such as economic conditions, climate, policies and mass media in which the food choice decisions take place.

Influences are dynamic and change over time and situations. They feed into the individual’s personal food system where they are cognitively translated into food choices. Personal food systems include the processes of developing food choice values (e.g. taste, cost, health, convenience, relationships), negotiation and balancing of food choice values, classification of foods and situations, and strategies, scripts and routines to expedite food choices in recurring situations.

Figure 2.5: Food choice process model. Source: Sobal & Bisogni (2009)
Applications of the food choice process model

The food choice process model as its entire concept has not been broadly applied yet, but it has been and is constantly revised and elaborated. For example, Jastran, Bisogni, Sobal, Blake & Devine (2009) recently investigated the concept of eating routines among working adults. Jabs, Devine, Bisogni, Farrell, Jastran & Wethington (2007) sought to get an understanding of how employed mothers constructed time for food provisioning for themselves and their families. Of interest were also the food choice strategies that different populations develop with respect to spillover of work onto food choices and family roles (Devine, Connors, Sobal & Bisogni 2003, Devine et al. 2006, Devine, Farrell, Blake, Jastran, Wethington & Bisogni 2009, Blake, Devine, Wethington, Jastran, Farrell & Bisogni 2009), the way people conceptualise and manage healthy eating (Falk, Sobal, Bisogni, Connors & Devine 2001) or how evening meals are constructed (Blake, Bisogni, Sobal, Jastran & Devine 2008). Bisogni, Connors, Devine & Sobal (2002) examined the role of identity in food choice and how it evolved over the life course. Another study explored how people categorised foods for different contexts (Blake, Bisogni, Sobal, Devine & Jastran 2007).

Although not an exhaustive list, it is notable that most of the studies aim to get insight into the mental processes underlying the construction of food choice decisions depending on setting, context and situation. The food choice process model differs to social cognitive models in that it views the food choice process as reflective and conscious, as well as habitual and automatic, which can be regarded as one of its major strengths. It further offers various aspects of dietary behaviour that draws out findings from individual disciplines with respect to other factors and can potentially be applied in clinical practice, community and policy work. Despite its complexity, the authors cite the absence and lack of depth on specific factors as the model’s limitation. In addition, it has been designed for application in Western cultures and therefore assumes multiple food options (Sobal et al. 2006). Even though the model seems applicable to children once they have acquired the cognitive skills to make food value negotiations, it has primarily been developed for use in adults.
A conceptual framework for understanding adolescent eating behaviour (Story & Neumark-Sztainer 2002)

Story et al. (2002) proposed an integrated, composite, theoretical framework to determine factors influencing adolescent food choice behaviour. The model rests on SCT and ecological theory and consists of four levels of influence: individual influences, social environmental influences, physical environmental influences and societal influences (Figure 2.6). *Individual influences* include psychosocial factors (e.g. attitudes, beliefs, knowledge, self-efficacy, taste and food preferences), biological factors (e.g. hunger), behavioural factors (e.g. meal and snack patterns, weight-control behaviours) and lifestyle factors (e.g. perceived barriers such as cost, time, demands, convenience). *Social environmental influences* refer to interpersonal relations within the family, with friends, neighbours and acquaintances. They can affect food choice behaviour through modelling, reinforcement, social support and perceived norms. *Physical environmental influences* are those that impact on accessibility and availability of foods within the community. For teenagers, what factors the most in proximal community settings are schools, fast food outlets, restaurants, shopping centres, vending machines, and convenience stores. *Societal influences* play a more distant and indirect role in determining food choice behaviour and include mass media and advertising, social and cultural norms of eating, food production and distribution systems, and policies and laws that affect food-related issues such as pricing.

**Applications of the conceptual framework for understanding adolescent eating behaviour**

As opposed to the food choice process model above, this model has been deductively developed by reviewing and conceptualising the literature, and not inductively using qualitative research methods. Moreover, it served as a theoretical framework for further quantitative studies related to adolescent food consumption patterns (Neumark-Sztainer, Wall, Perry & Story 2003, Bauer, Larson, Nelson, Story & Neumark-Sztainer 2009, Burgess-Champoux, Larson, Neumark-Sztainer, Hannan & Story 2009, DeLong, Larson, Story, Neumark-Sztainer, Weber-Main & Ireland 2008, Kubik, Lytle, Hannan, Perry & Story 2003). However, other researchers have used the model qualitatively, for example to explain
food choices in Irish children and teenagers (Fitzgerald et al. 2010) and to identify barriers of healthy eating among teenagers (Stevenson, Doherty, Barnett, Muldoon & Trew 2007).

In fact, complex theoretical frameworks aiming to explain influences on food choice behaviour among children and teenagers are still scarce. Livingstone & Helsper (2004a) has extended the work of Story et al. (2002) based on a literature review on the effect of advertising on children and adolescent eating behaviour, but criticised it for the lack of emphasis on the interaction between the different levels of influences. On the other hand, Vereecken, Ojala & Jordan (2004) have endorsed the model for its complexity and integration of multiple settings and factors. Compared to the food choice process model, this theoretical framework lacks depth, detail and specificity, particularly in terms of the mental processes involved in food choice decisions and description of factors influencing these. It puts more emphasis on environmental aspects of dietary behaviour and how proximate or distant they are to food choice behaviour of children or teenagers.

Figure 2.6: Schematic representation of the theoretical framework of adolescent food choice behaviour. Source: Story et al. (2002)
2.3 Food allergy

2.3.1 Definition and epidemiology

Over many years the terminology used to characterise adverse reactions to food was confusing and lacked standardisation. To introduce consistency, the World Allergy Organisation published a revised nomenclature for allergic diseases (Johansson, Bieber, Dahl, Friedmann, Lanier, Lockey, ... & Williams 2004). Food hypersensitivity is now the umbrella term that covers all reactions to food. The term food allergy is used when an immunological mechanism has been defined. Food allergy is usually mediated by IgE antibody directed to specific food proteins (IgE-mediated food allergy), but other immunologic pathways can also be involved (non-IgE-mediated food allergy). All other reactions such as food intolerances are classified as non-allergic food hypersensitivity.

The prevalence of food allergies varies by age and geographic location. In the UK, food allergies are mainly caused by eight foods: cow’s milk, hen’s egg, peanuts, tree nuts, sesame, crustaceans, fish and wheat (Venter, Pereira, Grundy, Clayton, Arshad & Dean 2006, Young, Stoneham, Petruckevitch, Barton & Rona 1994). Although the self-reported prevalence of food allergy can reach up to 35% in some countries (Rona, Keil, Summers, Gislason, Zuidmeer, Sodergren, ... & Madsen 2007), numbers for true food allergies are much lower. Data from the UK suggest that 1.4 - 1.8% of adults (Young et al. 1994), 2.3% of teenagers aged 11 and 15 years old (Pereira, Venter, Grundy, Clayton, Arshad & Dean 2005), and 1.6 - 2.5% children six years of age are affected (Venter et al. 2006). Rates of food allergy are highest in the first years of life with 5 - 6% in children up to 3 years because many children will outgrow their food allergy during childhood, particularly those who are allergic to milk or egg (Venter, Pereira, Voigt, Grundy, Clayton, Higgins, ... & Dean 2008).

2.3.2 Symptoms

The symptoms of allergic reactions to food are not organ specific and occur in the gastrointestinal tract, skin and respiratory tract. In the gastrointestinal tract, food allergy may trigger mild pruritus, tingling and/or angioedema of the lips or tongue, sensation of tightness in the
throat, nausea, abdominal pain, cramps, vomiting and diarrhoea. Skin reactions can result in generalised pruritus, eczematous rash or flushing, urticaria (hives) and angioedema. In the respiratory tract, symptoms of allergic rhinoconjunctivitis are typical, i.e. conjunctivitis (itchy eyes, erythema and tearing) and rhinitis (itchy, congested and running nose, sneezing). However, respiratory symptoms can also affect the larynx and lower respiratory tract where food allergy can cause laryngeal oedema (stridor, staccato cough, hoarseness and sensation of tightness) and asthma (dyspnoea, cough and wheezing) (Sampson 2005, NICE 2011).

Severe, generalized reactions are classified as anaphylaxis. Anaphylaxis presents with many different symptoms related to the gastrointestinal tract, skin tract, respiratory tract and cardiovascular systems. The development of cardiovascular symptoms including syncope, a feeling of faintness, palpitations and/or chest pain, and hypotension may finally lead to a potentially fatal anaphylactic shock (Sampson 2000). Fatal food-induced anaphylaxis has been associated with a number of common factors: most victims are teenagers or young adults; those with a known food allergy to peanuts or tree nuts and who have asthma; and when there is evidence of a failure to immediately give epinephrine (Bock, Muñoz-Furlong & Sampson 2007, Pumphrey & Gowland 2007).

### 2.3.3 Diagnosis

A thorough clinical history and physical examination is central in diagnosing food allergy as it determines symptoms, possible causative foods, the amounts triggering a reaction, time frame of reaction, involvement of other factors such as alcohol, exercise or medication, and reproducibility of reactions. The history should suggest the possible immunologic mechanism involved, specifically whether the food allergy is IgE mediated or non-IgE mediated, which informs the type of testing to be followed (Boyce et al. 2010, NICE 2011). If IgE-mediated food allergy is indicated, skin prick tests (SPT) or food-specific IgE blood tests can be used to confirm a clear clinical history to the tested food. A positive test result does not confirm an IgE-mediated allergic reaction, whereas a negative test result essentially predicts the absence of it (Sicherer & Sampson 2010). In the light of these inaccuracies in allergy testing, researchers have developed a new method that determines
specific IgE-binding components in purified allergen extracts. Although not commercially available yet, component testing could improve the specificity of allergy testing and might be helpful in understanding potential severity and likelihood of reactions (Kattan & Wang 2012).

Currently, oral food challenge is the most reliable method to diagnose food allergy. Food challenges typically include a period of elimination diet of the suspected food or foods to ensure that symptoms have resolved before reintroducing the offending food. The food challenge consists of a gradual consumption of increasing amounts of suspected food at fixed intervals under observation. Since severe reactions could be elicited, medical staff must be immediately available to treat anaphylaxis. Double-blind placebo-controlled food challenge (DBPCFC), when both patient and clinician are blinded to what the patient is being fed, is considered the gold standard, but open (unblinded) or single-blind (the patient is blinded) food challenges are more often used (Sicherer & Sampson 2010, Sicherer 1999). For true blinded test conditions, professional validated challenge materials or recipes are a prerequisite (Vlieg-Boerstra, Herpertz, Pasker, van der Heide, Kukler, Jansink, ... & Dubois 2011).

2.3.4 Management and treatment

Food allergies are particularly challenging for medical research in that there is at present no cure for food allergies available. As a consequence, the only therapeutic strategy to prevent allergic reactions is the elimination of food or foods containing the allergen from the individual’s diet and the treatment of allergic reactions. While it might be sufficient to take antihistamines after exposure to an allergy-causing food in minor reactions, severe reactions require the prompt administration of self-injectable epinephrine. Patients and caregivers should therefore receive training in recognising symptoms, using the autoinjector, and activating emergency services. Additionally, they should be encouraged to wear medical identification jewellery (Sicherer & Sampson 2010).

However, investigators are exploring new immunotherapeutic options including oral
immunotherapy, sublingual immunotherapy and Chinese herbs; all of these have shown great promise as potential treatments for food allergy. These approaches raise hope that an active therapy will be available in the future (Khoriaty & Umetsu 2013, Chaudhry & Oppenheimer 2012, Firszt & Burks 2011).

2.3.5 Dietary management of food allergies

Implementing an avoidance diet often seems easier than it is. In fact, it is a complex undertaking that requires education about label reading, cooking, preventing cross-contamination, and communicating information to friends, family and restaurant personnel (Kim & Sicherer 2011, Muñoz-Furlong 2003). To be able to identify relevant ingredients on pre-packaged foods, individuals should be taught how to read food labels. Labelling is particularly relevant to those with food allergies as incorrect or ambiguous labelling practices can lead to accidental exposure to allergens in processed foods (Fiocchi & Martelli 2006). The current European food labelling laws came into effect in November 2005 and were updated in 2007 (European Commission 2007). Until then, an ingredient making up to <25% of the final product did not have to be listed on the label. With the new law, the presence of any of the major food allergens and their products need to be stated on the label. These are: cereals containing gluten, crustaceans and fish, eggs, peanuts and tree nuts, soy, cow’s milk, celery, mustard, sesame seeds, lupins, molluscs, and sulphites at concentrations of more than 10 mg/kg or 10 mg/litre. However, this rule does not apply to unpacked foods or foods containing traces of allergens as a result of producing other products in a food factory. Thus, consumers with food allergies rely on manufacturers to provide their products with ‘may contain’ labels. Likewise, allergy statements such as ‘milk-free’ or ‘egg-free’ or those that warn of allergen ingredients are only voluntary. Individuals with food allergies are advised to avoid all products with precautionary labelling, also those that ‘may contain’ traces of allergens (Boyce et al. 2010). A Canadian survey identified 47.8% food-allergic individuals who had experienced an accidental exposure; of those 47.0% attributed the event to inappropriate labelling, 28.6% to failure to read a food label, and 8.3% to ignoring a precautionary statement (Sheth, Waserman, Kagan, Alizadehfar, Primeau, Elliot, ... & Clarke 2010). Other studies also show that many food-allergic consumers or their
caregivers ignore ‘may contain’ alerts on foods (Noimark & Cox 2008, Barnett, Muncer, Leftwich, Shepherd, Raats, Gowland, ... & Lucas 2011a) or have difficulties reading and interpreting food labels (Barnett et al. 2011a, Voordouw, Cornelisse-Vermaat, Yiakoumaki, Theodoridis, Chrysochoidis & Frewer 2009, Vierk, Koehler, Fein & Street 2007, Joshi, Mofidi & Sicherer 2002). On the other hand, too widespread use of precautionary labelling limits food choices which then has a negative impact on the quality of life. There is a current debate regarding the introduction of threshold levels for tolerable amounts of allergens in foods as zero risk is not considered as a realistic option (Zurzolo, Mathai, Koplin & Allen 2012, Madsen, Hattersley, Allen, Beyer, Chan, Godefroy, ... & Crevel 2012).

Cross-contamination cannot only occur during the manufacturing process if shared equipment is not carefully cleaned between processing different products, but at various stages of the food supply chain. For example, it can be an issue in restaurants where cooking space is more constrained, dedicated equipment is uncommon, and things are constantly switched (Taylor & Baumert 2010). In a study by Furlong, DeSimone & Sicherer (2001), 22% of 106 participants who had experienced an allergic reaction in a restaurant or other food establishment, reported accidental exposures from contamination caused primarily by shared cooking/serving supplies. Sources of cross-contamination are also found in grocery stores where meats and cheese are sliced on the same equipment and pastries with and without nuts are kept side by side (Christie 2001). At the individual level, foods are easily contaminated when using the same frying oil for all foods or the same spoon for serving different foods (Wright 2009). Strategies such as having designated areas for allergen-free foods in the refrigerator and cupboards, and placing stickers on ‘safe’ foods to help all family members identifying them have anecdotally been reported (Muñoz-Furlong 2003).

Eating in restaurants and food establishments is particularly challenging for individuals with food allergies. In addition to the increased likelihood of cross-contamination, accidental exposure to allergens in food can also happen due to lack of food allergy knowledge or misconceptions by restaurant personnel. Bailey, Albardiaz, Frew & Smith (2011) detected significant gaps in the food allergy knowledge of staff in restaurants. Out of
90 restaurants, where one staff member from each took part in the study, 38% believed that an individual experiencing an allergic reaction should drink water to dilute the allergen; 23% thought that consuming a small amount of an allergen is safe; 21% reported that allergen removal from a finished meal would render it safe; 16% agreed that cooking food prevents it causing allergy and 12% were unaware that allergy could cause death. Despite those misunderstandings, 81% reported confidence in providing a safe meal to a food-allergic customer. Individuals with food allergies therefore need to clearly communicate the nature of their allergy to restaurant staff and ask questions about potentially hidden allergenic ingredients in foods, food preparation, and possible cross-contamination (Kim & Sicherer 2011, Venter & Meyer 2010).

In children, dietary management in schools is a major concern since food sharing, cross-contamination in the school cafeteria, school celebrations, field trips and other issues appear (Muñoz-Furlong 2003). Bollinger, Dahlquist, Mudd, Sonntag, Dillinger & McKenna (2006) reported in their study on 87 families that food allergy had an impact on school attendance in 34%, with 10% choosing to home school their children because of food allergy. Schools are encouraged to implement protocols for managing child food allergy and life-threatening anaphylaxis to improve the safety of the school setting (Young, Muñoz-Furlong & Sicherer 2009). School policies include provision of allergen-free school lunches for children with food allergies, use of nonedible treats for school parties, and training of school staff in administering epinephrine (Muñoz-Furlong 2003).

Communicating information regarding food allergy is also important with friends and family. In a recent study, parents have described family members as exposing children to the risk of nuts, either during routine visits or at times of gathering and celebration, such as Christmas or birthdays (Pitchforth, Weaver, Willars, Wawrzkowicz, Luyt & Dixon-Woods 2011). Indeed, most fatal reactions take place at home or at a friend’s or relative’s house (Pumphrey & Gowland 2007). Disruption of social activities have not only been reported by parents of children with food allergies (Bollinger et al. 2006), but also in adolescent and adults who seem to be even more affected by them than children (Flokstra-de Blok, Dubois,
Another concern for the dietary management of food allergies is travelling. Vacation choices including holidays in the home country and abroad, all-inclusive resorts or cruises require advanced planning. It is advisable to choose accommodation where self-catering is possible or to take safe foods along (Kim & Sicherer 2011). Other options are calling hotels ahead to ensure that they accommodate dietary requirements. Similarly, those travelling on aeroplanes should obtain information regarding the ingredients of airline foods beforehand (Venter & Meyer 2010). In some cases the safest bet is to avoid eating potentially unsafe foods, particularly for individuals with severe peanut and tree nuts allergies, as serious and potentially life-threatening reactions to those have been reported on commercial airlines (Comstock, DeMera, Vega, Boren, Deane, Haapanen & Teuber 2008, Sicherer, Furlong, DeSimone & Sampson 1999).

2.3.6 Nutritional aspects of food allergies

Dietary management of food allergies should also involve the careful instruction on planning and following a nutritionally balanced diet. Consequently the aim of an avoidance diet is not only to rapidly and completely eliminate the symptoms, but also to introduce a diet that adequately nourishes and supplies the food-allergic individual with all the nutrients required for growth, normal development and performance (Venter, Laitinen & Vlieg-Boerstra 2012). Since nutrient requirements per unit body weight are particularly high at a young age, avoidance diets in young children with food allergies demand special attention (Koletzko & Koletzko 2009). Misconceptions about food allergies are not uncommon (Roesler, Barry & Bock 1994) and parents are inclined to impose more stringent dietary restrictions onto their children than recommended (Ng, Turner, Kemp & Campbell 2011). Adults are not at the same risk for nutritional deficiency as children, but long-term avoidance of major food groups can increase the risk for adverse health consequences (Skypala 2011). In order to avoid nutrient deficiencies and serious health problems, avoidance diet and nutritional status should be monitored by specialised dieticians (Hubbard 2003).
Strict avoidance of the causal food, including even in trace amounts, is necessary for most patients suffering from IgE-mediated food allergy (Venter & Meyer 2010). However, there is evidence that some children are able to tolerate certain amounts of allergens when extensively heated, e.g. egg or milk in the form of processed foods (Lemon-Mulé, Sampson, Sicherer, Shreffler, Noone & Nowak-Wegrzyn 2008, Nowak-Wegrzyn, Bloom, Sicherer, Shreffler, Noone, Wanich & Sampson 2008). Additionally, it has been demonstrated that consumption of baked eggs and milk, if tolerated, accelerates the resolution of egg and cow’s milk allergy in children, respectively (Leonard, Sampson, Sicherer, Noone, Moshier, Godbold & Nowak-Wegrzyn 2012, Kim, Nowak-Wegrzyn, Sicherer, Noone, Moshier & Sampson 2011). Whether strict avoidance should remain the mainstay of treatment in IgE-mediated food allergy is hotly debated. Some researchers argue that some degree of allergen exposure may be therapeutic by introducing immunologic tolerance (Allen, Campbell & Kemp 2009, Kim & Sicherer 2010), whereas those holding the opposite view highlight the uncertainty and potential dangers of serious reactions if deliberate exposure was advocated (Prescott, Bouygue, Videky & Fiocchi 2010). Both sides agree that absolute avoidance is impossible and further research is needed before recommendations can be given.

The nutritional quality of avoidance diets depends on the number of foods that must be avoided, the frequency of the food being eaten, the availability of nutritionally-suitable alternatives, and the overall palatability. Eliminating a single allergen from the diet is easier to facilitate than the elimination of two or more allergens. The adequacy of a diet can be heavily impacted upon if an allergen abundant in foods (including milk, egg, soybean, or wheat) is avoided. On the other hand, the elimination of a single food (e.g. peanut or fish) should not compromise the nutritional quality of a diet (Christie 2001, Venter & Meyer 2010, Koletzko & Koletzko 2009). The growing range of ready-prepared meals makes the exclusion of allergens, which are often contained in trace amounts (e.g. nuts and soybean), very difficult. The additional avoidance of food for cultural, religious or ethical reasons could pose a risk for the nutritional adequacy of the diet (Venter & Meyer 2010). Life-long exclusion diets for confirmed food allergies affect the nutritional status more than short-term exclusion diets (4-6 weeks) for diagnostic purposes. In addition to the risk of a nutritionally
imbalanced diet, the avoidance of a large number of foods might lead to a general loss of interest in food, which then again can affect the food intake, especially in children (Kershaw 2009).

When introducing an avoidance diet, considerations regarding substitutions for eliminated foods have to be made. Allergen containing foods can be replaced by foods that provide comparable nutrients or foods that have been fortified. Nowadays there are a number of substitutes available that can be used as alternatives to those excluded. These include milk substitutes, egg-free cakes, wheat-free products and many others that can readily be purchased at most local supermarkets or on the internet. Supermarkets also often provide ‘free from’ lists about readily-available food items that do not contain allegedly ‘allergenic’ foods (e.g. puffed rice cakes) and maintain helplines for customers (Grimshaw 2006, Venter & Meyer 2010). Despite the suitable replacement products on the market, many everyday foods can be used in avoidance diets. Individuals with food allergies and parents of children with food allergies should receive assistance on modifying recipes by replacing key ingredients such as milk, egg or wheat. ‘Allergyfree’ cookbooks might also be helpful. However, many family recipes can be adapted to avoidance diets (Mofidi 2003, Venter & Meyer 2010). In children, it is important to emphasise that new foods need to be introduced in the same way as with a healthy child in order to keep the diet interesting and palatable (Grimshaw 2006).

In some circumstances, it is impossible or very difficult to provide a nutrient-rich diet, even if several food substitutes have been incorporated into the diet. This could be the case in children with multiple food allergies that have to avoid staple foods such as milk and wheat. Here, the analysis of a food diary can give a good indication of the nutritional adequacy of the diet. If the diet does not supply the necessary nutrients, the use of dietary supplementation should be considered, although it is important to assess the dose required (Grimshaw 2006).

Table 2.1 gives an overview of foods and ingredients to avoid, which nutrients might
be reduced, alternative foods, and level of avoidance required when suffering from food allergies to the eight major allergens in the UK (Venter et al. 2006, Young et al. 1994).

For example, an allergy to cow’s milk means that all dairy products have to be avoided. This does not only include the products themselves but also manufactured foods using milk or butter in their ingredients. Hence, vitamin A, vitamin D, riboflavin, pantothenic acid, cyanocobalamin, calcium, magnesium and phosphate have to be derived from other sources. If alternative milks or milk substitutes such as soya milk are not fortified, appropriate amounts of calcium and vitamins are difficult to obtain from the diet (Mofidi 2003). As mentioned earlier, some children with cow’s milk food allergies are able to tolerate certain amounts of milk, especially when extensively heated (Nowak-Wegrzyn et al. 2008).
<table>
<thead>
<tr>
<th>Sources</th>
<th>Nutrients involved</th>
<th>Alternatives</th>
<th>Level of avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>Butter and most fat spreads, cheese,</td>
<td>Vitamin A, vitamin D, riboflavin, pantothenic</td>
<td>&lt; 6 months: eFH, AAF(^a)</td>
</tr>
<tr>
<td></td>
<td>cow’s, sheep and goat’s milk,</td>
<td>acid, cyanocobalamin, Ca, Mg, phosphate</td>
<td>&lt; 2 years: eFH, AAF, soya-based formula</td>
</tr>
<tr>
<td></td>
<td>evaporated and condensed milk, cream,</td>
<td></td>
<td>&gt; 2 years: rice milk, soya milk,</td>
</tr>
<tr>
<td></td>
<td>ghee, yoghurt, ice creams, custard,</td>
<td></td>
<td>oat milk, chufa milk, potato milk,</td>
</tr>
<tr>
<td></td>
<td>dairy desserts and manufactured foods</td>
<td></td>
<td>coconut (Cocos nucifera) milk, pea (Pisum</td>
</tr>
<tr>
<td></td>
<td>using milk or butter in their ingredients</td>
<td></td>
<td>sativum) milk</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other foods: milk-free versions of spreading</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>fats, cheese, yoghurts, ice cream and cream</td>
<td></td>
</tr>
<tr>
<td>Egg</td>
<td>Egg white and yolk, cakes, biscuits,</td>
<td>Riboflavin, biotin, protein, vitamin A,</td>
<td>Egg replacers</td>
</tr>
<tr>
<td></td>
<td>speciality breads, mayonnaise</td>
<td>cyanocobalamin, vitamin D, vitamin E,</td>
<td>Adjust recipes with extra liquid or fruit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>pantothenic acid, Se, iodine, folate</td>
<td>purees</td>
</tr>
<tr>
<td>Peanut</td>
<td>Peanuts, peanut oil, peanut flour,</td>
<td>Vitamin E, niacin, Mg</td>
<td>Variety of egg-free products such as mayonnaise,</td>
</tr>
<tr>
<td></td>
<td>peanut butter, some sprouts, confectionery,</td>
<td></td>
<td>cakes, muffins, puddings and omelette mix</td>
</tr>
<tr>
<td></td>
<td>frozen desserts, Asian dishes, peanut</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>snacks, trail mix, some rice crackers,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>some cereal bars, some cookies, brownies,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>nut toppings on ice cream, vegetarian and</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>vegan foods, satay sauce, some breakfast</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|                  | cereals, pesto sauce may sometimes contain peanut

\(^a\)extensively hydrolysed formula
\(^b\)amino acid based formula
Modified from Venter & Meyer (2010)
Table: 2.1: The eight major food allergens in the UK: their sources, nutrients, alternatives, and level of avoidance required

<table>
<thead>
<tr>
<th>Sources</th>
<th>Nutrients involved</th>
<th>Alternatives</th>
<th>Level of avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree nut*</td>
<td>Depends on type of nut</td>
<td>Usually strict avoidance</td>
<td></td>
</tr>
<tr>
<td>Sesame seed</td>
<td>Protein, fats, Vitamin E, Ca, K, P, vitamin B and Fe</td>
<td>Avoidance has no marked effect on nutrition</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>All fish: protein, iodine</td>
<td>Usually strict avoidance</td>
<td></td>
</tr>
<tr>
<td>Crustaceans</td>
<td>Similar nutrients to white fish</td>
<td>Usually strict avoidance</td>
<td></td>
</tr>
</tbody>
</table>

*Almond, hazelnut, walnut, cashew nut, pecan nut, Brazil nut, pistachio nut, macadamia nut, Queensland nut

Polyunsaturated fatty acids

Modified from Venter & Meyer (2010)
Table: 2.1: The eight major food allergens in the UK: their sources, nutrients, alternatives, and level of avoidance required

<table>
<thead>
<tr>
<th>Sources</th>
<th>Nutrients involved</th>
<th>Alternatives</th>
<th>Level of avoidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Bread, breakfast cereals, pasta, cakes,</td>
<td>Fibre, thiamine, riboflavin, niacin, Ca, Fe, folate if fortified</td>
<td>Range from strict avoidance to tolerance of certain amounts</td>
</tr>
<tr>
<td></td>
<td>biscuits, crackers, cold cooked meat,</td>
<td></td>
<td>Coeliac disease: strict avoidance of gluten</td>
</tr>
<tr>
<td></td>
<td>pies, batter, flour, semolina, cous</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cous, bottled sauces and gravies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maize, rice, potato, cassava (Manihot esculenta), yam, quinoa (Chenopodium quinoa), millet, gram (chickpea; Cicer arietinum), sago, tapioca, amaranth, buckwheat (Fagopyrum esculentum)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wheat- and/or gluten-free foods</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Barley, rye and oats may be tolerated by some individuals with wheat allergy or intolerance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oats may be tolerated by some individuals with coeliac disease</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of alternative grains should be individualised and based on tolerance as determined by clinician and/or dietitian</td>
<td></td>
</tr>
</tbody>
</table>

Modified from Venter & Meyer (2010)
2.4 Summary: context of research

This literature review has given insight into important aspects of the two areas of investigation. It has highlighted the diversity, complexity and dynamics of food choice behaviour and the theoretical perspectives that can be used to study this multidisciplinary subject. Combining various disciplines, determinants and approaches into one integrated, comprehensive model is and remains challenging. The fact that food choice behaviour and food consumption patterns are flexible concepts that are changed or modified throughout the life-course (Sobal & Bisogni 2009) also has theoretical implications. Although there is evidence for cognitive-motivational processes related to food choice in schoolchildren (Michela & Contento 1986), the social environmental determinants, such as parents, play a major, perhaps the most important, role in food choices at this age.

Food allergies are an emerging issue for all age groups and because there is currently no cure available, eliminating offending foods from the diet is the mainstay of treatment (Boyce et al. 2010). Although this is a relatively easy undertaking in some circumstances, individuals with multiple food allergies or allergies to staple foods are confronted with major difficulties in managing their diet. Healthcare professionals and policy makers have developed guidelines for the dietary management of food allergies (Fiocchi, Brozek, Schünemann, Bahna, von Berg, Beyer, ... & Vieths 2010, Boyce et al. 2010) and assume that individuals with food allergies are able to adapt their behaviour to them. However, as outlined, food choice behaviour is embedded in cultural, social, economic, psychological and biological influences that might have an impact on how recommendations are put into practice. If not successfully managed, elimination diets can have severe health consequences for all age groups, but particularly for children and teenagers where nutrients are needed for adequate growth and development.

It seems clear that these two research areas are inevitably interwoven. Without an understanding of the factors influencing food choices and the impact food allergies have on these factors, dietary management of food allergies, and with it the dietary quality, cannot
be improved. Although assumed, it remains unclear whether the dietary quality is indeed affected by these chronic conditions. At present, there is no study that has attempted to investigate the link between these two important fields of research, or more precisely, that has applied the concept of food choice to food allergy research by examining behaviour and outcome.

2.5 Aims for this research

Food choice behaviour is a predictor for food consumption patterns and ultimately for nutrient intake. Therefore, two principle aims are formulated for the purpose of this research:

- First to obtain a full understanding of the influences on food choice behaviour within the food-allergic population in order to shed light on several factors relevant to food allergy management.
- Second to evaluate the dietary quality of the food-allergic population in order to determine the impact of food allergies on dietary quality.

The results obtained from this research will add new and essential knowledge to our current understanding of practical issues around food allergy management. With this knowledge, important aspects of food choice currently posing a challenge to the dietary management of food allergies can be addressed and the quality of life of those affected be increased. The results will further make an important contribution to our understanding of the dietary and nutritional needs of the food-allergic population; this will help improve the diet of individuals with food allergies so that optimal growth and health can be obtained and maintained, and adverse health consequences prevented. The results of this research will inform healthcare professionals and policy makers, enabling them to better tailor individual dietary advice and improve dietary guidelines.

Since influences on food choice behaviour and nutrient requirements vary across the lifespan and food allergies are affecting all age groups, it is important to investigate this issue in children, teenagers and adults. This has implications for the selection of the
approach used as developmental issues have to be taken into consideration. The research therefore has specified the following objectives:

- To explore the attitudes, behaviours, beliefs and experiences influencing the food choice behaviour of adults with food allergies.

- To explore the attitudes, behaviours, beliefs and experiences influencing the food choice behaviour of teenagers with food allergies.

- To test a novel approach to determine the impact of food allergies on mother-child interaction during a collaborative problem-solving activity in a food-related context.

- To assess and evaluate the dietary intake of macro- and micronutrients of children, teenagers and adults with food allergies.

### 2.5.1 Approaches and considerations guiding this research

Due to the diversity of the study population and the complexity of the research topic, multiple approaches and considerations are guiding this research. The first one refers to age groups studied, which include children, teenagers and adults aged 4-65 years. Children under the age of four will not be included in this research because eating starts to be influenced by environmental cues at the age of three to four (Patrick & Nicklas 2005a) and young children with food allergies have been intensively studied with respect to dietary intake, for example recently by Flammarion, Santos, Guimber, Jouannic, Thumerelle, Gottrand & Deschildre (2011). To ensure consistency and to be able to demonstrate a marked effect of food allergies on food choice behaviour and dietary intake, the study population will only be included if an IgE-mediated food allergy to at least one of the major allergens in the UK - egg, milk, peanuts, tree nuts, sesame, crustaceans, fish or wheat (Venter et al. 2006, Young et al. 1994) - is indicated. Another consideration is that the data obtained in the dietary assessment study will be comparable to those of the general population from the National Diet and Nutrition Survey (NDNS), which included similar age ranges (Bates, Lennox, Prentice, Bates & Swan 2012). I further take the view that the most important aspects of food choice behaviour will become more noticeable and evident if a healthy comparison group is included in each study.
The second consideration refers to the theoretical approaches taken. As discussed in the literature review, the two main approaches to study food choice behaviour are the social psychological and the social ecological theories. My primary concern with these models is that they both attempt to explain food choice behaviour by emphasising one of the two perspectives - the individual or the environment. The plethora of determinants of food choice shows that the complexity of this behaviour is best reflected in multidisciplinary models. It is further important that models are selected in accordance with developmental issues impacting on the age group of interest, which are broadly characterised by a shift from social environmental influences predominant in childhood to more personal influences in adulthood. The approach taken in this research will consequently focus on social environmental influences in childhood, specifically parental influences as they are most dominant at this stage, and interrelational individual and environmental influences in adolescence and adulthood, although to a different degree. The theoretical approaches can be investigated using qualitative and quantitative research methods, which are both applied in this research. An in-depth discussion of the methodological approaches and methods used in this research is found in the respective chapters.

The third consideration is that this research project employs a mix of various approaches and methods, each chosen on the basis of their suitability to meet the objectives of the research. Johnson & Onwuegbuzie (2004: p. 17) have defined mixed methods research as “the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study.” This research project integrates four individual research studies, whereby three of them address objectives related to food choice behaviour and one an objective related to dietary intake as outlined above. While it could be argued that this research consists of two independent research questions, I hold the opinion that these two different concepts have a strong and bidirectional relationship, one referring to a behaviour and the other to an outcome. A mixed method approach is therefore applied to this research as only with the use of both qualitative and quantitative research methods can the dietary management of children, teenagers and adults with food allergies be fully understood.
Chapter 3

Food choice behaviour of adults with food allergies

3.1 Overview

This chapter outlines how food allergies affect food choice behaviour in adults. To get an in-depth understanding of the attitudes, behaviours, beliefs and experiences that make people choose the food they eat, a qualitative research study was conducted. The investigation was underpinned by a theoretical model on food choice behaviour. Identified influences on food choice behaviour of food-allergic adults were contrasted to those of non-food-allergic adults and discussed in the context of existing literature into food choice behaviour. The results are interpreted in relation to health-related quality of life and consumer behaviour in adults with food allergies.

3.2 Background

3.2.1 Rationale for the study

Food choice is a complex human behaviour determined by a combination of factors ranging from biological and genetic, to social and cultural (Shepherd 2005). To make decisions about which food or drink to consume people need to consider what, how, when, where and with whom they will eat (Sobal et al. 2006). The food selection process impacts on people’s
acquisition, preparation or consumption of food in a wide range of situations and locations including grocery stores, restaurants, and vending machines, parties and social events, and meals and snacks at home. It involves not only conscious decisions, but also those that are automatic, habitual and subconscious (Furst et al. 1996).

Food allergies are a common problem, affecting approximately 3-4% of adults in westernised countries (Rona et al. 2007). At present, there is no available cure for food allergies, and removing the culprit foods from the diet remains the mainstay of treatment (Boyce et al. 2010). There is anecdotal evidence that the food-allergic population needs to be constantly attentive and extremely vigilant as to what they are eating. In order to be successful in avoiding the offending foods, knowledge in reading labels of manufactured products, cooking skills, and effective communication to relatives, friends and those catering food is necessary (Kim & Sicherer 2011, Venter & Meyer 2010). Awareness about the risks and dangers of an accidental exposure can increase anxiety (Lyons & Forde 2004), and often result in reduced quality of life (Flokstra-de Blok et al. 2010, Primeau, Kagan, Joseph, Lim, Dufresne, Duffy, ... & Clarke 2000). In some circumstances, food allergies may also have consequences for lifestyle issues and welfare (Knibb, Booth, Platts, Armstrong, Booth & MacDonald 2000). Recent research has focused on the challenges for food-allergic consumers of eating out (Leftwich, Barnett, Muncer, Shepherd, Raats, Gowland & Lucas 2011) and shopping (Cornelisse-Vermaat, Voordouw, Yiakoumaki, Theodoridis & Frewer 2008, Voordouw et al. 2009). These research studies provide valuable information on how food allergies affect individuals’ lives and they also give a limited insight into food choice behaviour in particular settings (i.e. when eating out and while shopping). However, little is known to what extent food allergies affect the full complexity of food choice behaviour in adults, and to what degree they determine their food choice decisions. To close this gap in research, a qualitative study investigating the food choice behaviour of adults with food allergies was undertaken.
3.2.2 Aims and objectives

The principal aim of this part of the research programme was to explore the attitudes, behaviours, beliefs and experiences that influence food choice behaviour of adults with food allergies.

The following objectives were set to meet this aim:

- To gain knowledge of the factors influencing the food choice behaviour of adults with food allergies.
- To gain knowledge of the factors influencing the food choice behaviour of adults without food allergies.
- To compare factors identified by adults with and without food allergies in order to explore potential differences in the food choice behaviour between the two groups.

3.2.3 Rationale for a qualitative approach

A qualitative approach was chosen to meet the above objectives. Qualitative research encompasses many different traditions, theories or paradigms, research strategies, methods or practices across a number of disciplines (Snape & Spencer 2003). Despite the lack of an agreed definition, qualitative research has a set of key characteristics. There is a fairly wide consensus that qualitative research is a naturalistic, interpretative approach aiming to provide an in-depth, complex understanding of how people see and interpret their social world (Snape & Spencer 2003). To obtain this understanding, qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them (Denzin & Lincoln 2005).

In recent years, qualitative research has penetrated traditional quantitative disciplines, including health research (McDonald 2009). There, it can answer questions on how evidence that was gathered from clinical epidemiology is applied in clinical practice (Green & Britten 1998). With qualitative research, areas inaccessible to quantitative research can be reached. It has gained wide recognition in studies of health service organisations and
policy, particularly when an understanding of the effect that policy changes or healthcare reforms have had on health professionals and patients is needed. Qualitative techniques can also be used to supplement quantitative methods (e.g. as part of a validation process) or to explore a situation or behaviour (e.g. treatment adherence or the use of clinical guidelines) (Pope & Mays 1995). Similarly, qualitative research methods are increasingly employed to investigate nutrition and food-related phenomena as they are closely linked to human behaviour and behaviour change (Harris, Gleason, Sheean, Boushey, Beto & Bruemmer 2009). The research question posed by this study has arisen out of the need to gain insight into aspects of clinical health research and human eating behaviour, and thus a qualitative approach was considered most appropriate in answering it. An understanding of the patient’s perspective is particularly important in the case of people with allergies, where management of the condition is based on long-term strategies undertaken by the patients themselves (Gallagher, Worth & Sheikh 2009).

Since qualitative research can be conducted in various ways and traditions, many authors believe it is important for the qualitative researcher to reveal the paradigm that guides his/her thinking and planning process (Miles & Huberman 1994, Snape & Spencer 2003, Creswell 2007, Kuper, Reeves & Levinson 2008, Tavallaei & Abu Talib 2010). By doing so, s/he makes clear how s/he interprets the shape of the social world. Depending on the philosophical school s/he is coming from, s/he will have a distinct view of what is real, what can be known, and how these social facts can be truly represented (Miles & Huberman 1994). For this study, I conform to the position of Snape & Spencer (2003) whose ontological stance (what it is possible to know about the world) adheres to the ‘subtle realism’ seen in the work of Hammersely (1992). Subtle realists assume that there is an objective reality, but this reality is only accessible through our perspective of it. In terms of epistemological stance (how it is possible to find out about the world), the approach embraces aspects of positivism and interpretivism. ‘Objectivity’ is seen as an ideal that the researcher attempts to attain through careful sampling and specific research techniques. At the same time, the importance of understanding people’s perspectives of their social world is acknowledged (Snape & Spencer 2003).
3.3 Method

The study design is shown as a flow chart in Figure 3.1 and further delineated in the following sections.

Figure 3.1: Flowchart of study in adults
3.3.1 Sample

Qualitative research follows a different sampling logic compared with quantitative research and uses non-probability sampling for selecting a population for study. Representativeness of the sample is not achieved through statistics but through representation of key characteristics (Ritchie, Lewis & Elam 2003). The purpose of sampling lies in selecting \textit{information-rich} cases for study in depth (Patton 2002). Sampling designs in qualitative studies therefore tend to be \textit{purposive} rather than \textit{random}. In purposive sampling, participants are selected for inclusion based on certain characteristics relevant to the study (Devers & Frankel 2000). The sample selection ultimately determines the quality of the research (Coyne 1997). However, qualitative sampling procedures are rather flexible and there is little agreement on definitions and guidelines among authors (Marshall 1996).

The sample size of qualitative research studies is generally very small and, similarly to the sampling strategies, no rules for it exist. For Marshall (1996), the sample size depends on the complexity of the research question. Lincoln & Guba (1985) recommend a sample selection that is terminated when no new information is forthcoming and data saturation has been achieved. The sample size of this study was determined by data saturation but also by practical considerations such as time and resources. It was concluded that two focus groups in each population were adequate to meet the aim and objectives delineated above.

The sampling procedure selected for this study followed the stratified sampling strategy suggested by Patton (2002). This strategy aims to capture a variety of selected characteristics within a subgroup of interest, but these subgroups (strata) vary according to a key dimension. It therefore facilitates comparisons between different groups. The reason for selecting this sampling strategy was that this study included two sets of samples (strata): food-allergic adults and non-food-allergic adults. Adults were purposely sampled to vary in age, gender, socio-economic status, and for those with food allergies, in the range of foods to which they were allergic. This was achieved by constructing a sampling grid that reflected various combinations of these characteristics. To consider the inclusion of a potential participant in the study, they had to be aged 19-65 years old. Adults with food
allergies were enrolled in the study if the following criteria applied:

- IgE or non-IgE mediated allergy to at least egg, milk, peanuts, tree nuts, sesame, crustaceans, fish or wheat.

- Diagnosis needed to be confirmed with a positive Skin Prick Test (SPT)/serum specific IgE results plus a convincing clinical history or a positive food challenge.

Participants were excluded if they were suffering from another condition that had a marked impact on their dietary intake (e.g. diabetes). They also could not participate if they had language difficulties or a poor understanding of English as participants were required to be able to express themselves during a discussion held in English.

3.3.2 Ethical considerations

The Southampton and South West Hampshire NHS Research Ethics Committee (A) approved this research project in March 2010 (Appendix 3.1). Following this, Research and Development approval was sought from the Isle of Wight Healthcare NHS Trust. In accordance with Research Governance procedures I was issued a NHS research passport valid for the duration of the project.

When conducting qualitative research three main considerations are most commonly raised in ethical guidelines - informed consent, confidentiality and trust. Informed consent means that the participants must be fully informed about the purpose and nature of the research and what participation will require of them (Ryen 2011). Information sheets were sent to eligible or interested participants providing detailed information about the study (Appendix 3.2). Potential participants were informed that participation was voluntary and that they had the right to withdraw at any time during the study. They were given my contact details in case they had questions about the research. If potential participants had decided to take part they had to give written informed consent before the start of data collection (Appendix 3.3).

Ethical standards also require that the participants’ identity is protected. Researchers
are obliged to treat data with confidentiality in order to assure that identifying information will not be made available to anyone who is not directly involved in the study (Lewis 2003). Therefore, data was anonymised and kept in a locked cabinet, where I was the sole key holder. Electronic data including transcripts and audio recordings were kept in password-protected files. Each participant was given a number for the purpose of transcription and analysis. On reports, no identifiable data was used and participants were referred to as food-allergic and non-food-allergic.

The third ethics issue, trust, relates to the relationship between researchers and participants (Ryen 2011). Researchers need to consider any potential risks of harm for participants and themselves when planning the research study. This study did not cover a particularly sensitive topic, but I was aware that situations might occur where participants would not feel comfortable to talk. To minimise risks, focus groups took place in a public building and a second researcher accompanied me to all focus groups.

### 3.3.3 Recruitment

Potential participants were identified from records of the NHS allergy clinic on the Isle of Wight and a national support charity (The Anaphylaxis Campaign). The dietician from The David Hide Asthma and Allergy Research Centre on the Isle of Wight approached potential participants asking if they were interested in taking part in the study (Appendix 3.4). As a second route of recruitment of participants with food allergies, members of the Anaphylaxis Campaign in the Hampshire/Isle of Wight area were contacted (Appendix 3.5). All potential participants received an information package containing invitation letter, information sheet, consent form, screening questionnaires and worksheet (Appendices 3.2 - 3.7). Those willing to participate were asked to return the consent form with contact details and the screening questionnaire in the stamped self-addressed envelope provided. Non-food-allergic adults were recruited through advertisement in the local press and university website (Appendix 3.8). Those expressing interest in taking part received an information package including the same content as described above.
Valid consent forms and screening questionnaires were received from 60 adults. To achieve the optimum composition of the individual focus groups, participants with a wide range of characteristics such as age, gender and socio-economic status were selected.

### 3.3.4 Focus group

Focus groups have become a popular tool to gather qualitative data in health sciences research (Sim 1998) and are widely used to study influences on food choice behaviour (Brug, Lechner & Vries 1995, Bauer et al. 2004, Neumark-Sztainer, Story, Perry & Casey 1999, Chambers et al. 2008). Krueger & Casey (2000) describe focus groups as ‘a carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment’ (p.5). In a focus group, data is generated through the interaction between participants (Finch & Lewis 2003). People’s perceptions and experiences are shared within a relaxed group setting, which enables participants to explore and clarify their own view in response to what they hear from the other members (Kitzinger 1995). The main purpose of focus groups in this context was to draw upon the participants’ views and behaviours during the food choice process that were more likely to be revealed through group interaction. This, together with the richness of data that is expected to emerge from the discussion in a focus group (Finch & Lewis 2003), was a determining factor for the use of focus groups as the data collection method in this study.

#### 3.3.4.1 The role of the moderator

The role of the moderator determines the quality of the data generated in a focus group. The moderator of a focus group has a rather difficult task in that the right balance between encouraging interest and discussion, and controlling the group in a gentle way has to be struck (Finch & Lewis 2003). This balance also concerns the right amount of involvement in the discussion (Sim 1998). According to Finch & Lewis (2003), a good moderator is one that connects well to the group and is able to put them at ease. Important skills include adaptability, confidence, ability to encourage the group, assertiveness and tact, as well as those skills required for in-depth interviews such as the ability to verbalise and formulate questions using the right tone, content and context (Section 4.3.7.1). Krueger &
Casey (2000) emphasise that moderators should not only communicate verbally but also non-verbally by exhibiting signals that demonstrate respect and care. Active listening to each participant and believing in their knowledge and wisdom is central. Moderators need to be able to hold back their opinion whilst possessing expertise on the topic of discussion (Sim 1998).

Prior to the first focus group, I had training in moderating focus groups and experience in one mock focus group that was conducted with colleagues at the University of Portsmouth. That focus group gave me the opportunity to practice the use of techniques such as pausing and probing as suggested by Krueger & Casey (2000). Having obtained a degree in nutrition, I also had adequate background knowledge about the topic of the discussion. During the focus groups, I tried to hold my personal views and experiences back as much as possible. As I facilitated all focus groups, I reflected on my moderating performance after each of them to identify areas of weakness which I sought to improve in the next discussion. I achieved this by transcribing the recordings immediately after each focus group.

### 3.3.4.2 Procedure

The approach to the focus group discussion was informed by Krueger & Casey (2000). Participants were contacted the day before to remind them when and where the focus group was scheduled. The sessions were held in a meeting room of a local restaurant and a community centre on a weekday early evening. Both venues provided ‘neutral’ environments and were convenient to the participants. As group members arrived, they were welcomed and ushered to a reception room for light refreshments and casual conversations with the other participants. The pre-discussion time was also used to check if participants had completed their worksheets on which they were asked to record what they had eaten and drunk the previous day. After half an hour, participants were guided to the meeting room where the discussion took place. They were given number stickers matching their sitting order, which was intended to facilitate note-taking. Members were also asked to write down their favourite food on a sheet of paper.
Participants and myself were seated in a circular arrangement around a table with a digital audio recorder placed in the middle to capture all conversation (Figure 3.2). The assistant sat outside the arrangement at a separate table and recorded key issues raised in the discussion in as much detail as possible. I started the discussion with a personal introduction, an outline of the research project, and an explanation of the purpose of the focus group. This talk was also used to set out the ground rules and demonstrate the recording equipment. Participants were reassured about the confidential nature of the discussion and that no judgement over their eating habits would be made.

The food choice process model provided the theoretical framework for the questions of the topic guide (Appendix 3.9). The topic guide was further based on one previously used in the literature and modified to suit the purpose of the study. The key topics were taken from the protocol developed by Hargreaves, Schlundt & Buchowski (2002) and complemented with additional questions and prompts to elicit further discussion. The introductory question was designed to build up a degree of familiarity among participants and to help reinforce the feeling of being a ‘group’ (Finch & Lewis 2003). Following the introduction of each member, I began the general discussion with a broad topic that was easy to talk about. This topic was initiated with the use of a worksheet that the members had been asked to bring along. The purpose of the work sheet was to encourage independent thinking about factors
influencing the food choices using concrete examples (Neumark-Sztainer et al. 1999). A similar procedure was applied for the discussion of the favourite food. I listened carefully to all the factors mentioned during this stage and used them to steer the conversation towards the key questions which referred to more specific issues around food choices. Before closing the discussion, I concluded the main points raised in the discussion and invited the group to add or clarify their opinions. Participants were provided with a £10 gift voucher and reimbursement for travel expenses was arranged. They were also given a debriefing letter explaining details of the purpose of the project. Immediately after the discussion, I sat down with the assistant and reflected upon the session. This was done to collect first ideas about the data.

3.4 Data Analysis

3.4.1 Design

The qualitative analytical approach chosen for this study was thematic analysis. Thematic analysis is a qualitative analytic method for identifying, analysing and reporting themes within data (Braun & Clarke 2006). A theme can refer to a ‘manifest’ content of the data (directly observable in the information) but can also be identified at a latent level (underlying the phenomenon) (Boyatzis 1998). Thematic analysis does not sit within a pre-existing theoretical framework and is therefore widely applicable (Braun & Clarke 2006). Themes can come both from the data (inductive approach) and from theory or prior research (deductive approach) (Ryan & Bernard 2003). In the type of thematic analysis of this investigation, an existing theory was driving the questions formulated for the topic guide as well as the understanding of the participants’ answers. The theoretical underpinning of this research was provided by the multiple-perspective food choice process model (Falk et al. 1996, Furst et al. 1996, Connors et al. 2001, Sobal & Bisogni 2009). This model is useful in the context of this research as one of the main components - influences - explains how various factors emerging from past experiences and present situations influence eating habits. With its use, important factors involved in food choices of individuals or populations can be identified and modified (Sobal et al. 2006). It can therefore also be applied studying food choice...
behaviour in populations with chronic conditions such as food allergies. Otherwise, themes or patterns within the data were identified inductively.

The focus groups lasted approximately 90 minutes and were transcribed verbatim by myself immediately after each session. To check for accuracy, a second researcher went through the recordings while reading the transcripts. The transcription process can be considered as part of the first phase of Braun and Clarke’s criteria for thematic analysis (Braun & Clarke 2006), which guided the analysis of this study. Their approach to thematic analysis consists of six phases as displayed in Figure 3.3.

![Figure 3.3: Phases of thematic analysis according to Braun & Clarke (2006)](image)

At the beginning, the focus group transcripts were analysed separately for each population (food-allergic and non-food-allergic adults). The focus group was analysed as a whole group without delineating individual contributions. Data analysis was aided by NVivo 8 software (QSR International Pty Ltd; Doncaster, Victoria, Australia). NVivo is one of a number of computer-assisted qualitative data analysis software packages (CAQDAS), which integrates several functions to facilitate the management and analysis of data. One of its main benefits as compared to manual methods is the ease of handling large datasets, the ability to tag text passages that can be organised as codes, and the facilitation of collaborative analysis in team research (Finch & Lewis 2003).

In the first step, transcripts were read to familiarise myself with the data. This was repeated several times as ideas and potential patterns are created during this process. Notes of these ideas and identified patterns that emerged while reading through the transcripts were taken. Next, I went through each individual transcript to generate initial codes (nodes...
A code refers to ‘the most basic segment, or element, of raw data or information that can be assessed in a meaningful way regarding the phenomenon’ (Boyatzis 1998: p. 63). It is usually attached to text passages and takes the form of a label or a reduced summary of the text features (Miles & Huberman 1994). The initial codes applied in this analysis were still very broad and detailed. The purpose was to reduce the data and to bring them into an easier format. All text was coded even if it contained passages that did not seem relevant to the research question at first sight. The coding was done in a generous way so that the meaning of the text passage was maintained. Individual text passages were coded under as many different themes as considered relevant. Figure 3.4 gives an insight into the coding process.

Following this phase, the list of codes that had been produced was thoroughly screened for potential themes and patterns. For this purpose, codes that appeared similar were grouped together to examine for common threads. Once a theme was identified, the relevant codes were collated within that theme (generation of tree nodes in NVivo). In this phase, conceptualising of relationships between codes and different levels of themes was initiated. If a code did not fit into any theme it was temporarily allocated to a theme called ‘miscellaneous’. At this stage, each population (food-allergic and non-food-allergic) was still analysed separately. Before combining both datasets, a second coder had analysed one transcript and created her own set of themes from the interview in order to ensure consistency of the coding process (Section 3.4.2 on multiple coding). The other researcher and myself then sat down together and discussed and refined the themes. After that, I started generating overarching themes across both population datasets. By doing this, the two populations were compared on the subtheme level. An initial thematic map was also generated.

This phase was followed by a period of revising, rephrasing, reorganising, collapsing and dropping of the newly created overarching and subthemes. Themes were compared with coded text passages to check if they represented the actual content of the transcript. To verify the thematic map of overarching themes and subthemes, the entire dataset was re-read. Additional data was coded and allocated to a theme if it had been missed in an
earlier stage. In a further step, themes were defined and refined by writing a short summary for each individual theme within each population. Thematic maps were sent out to the participants (according to the population) asking if they could provide a reflection on the themes (Figure 3.5). Participants’ feedback was then incorporated into the final themes. The final phase of Brown’s and Clarke’s criteria involved the write-up of the study. While writing the ‘story’ of the data, final amendments to the themes were made.
Figure 3.4: Creating codes and themes in NVivo
Adults with food allergies

WHY EAT?
- I just feel like eating
  - Food choices are influenced by the mood I am in
  - Eating because food is there
  - I eat when I am hungry
- When it comes to food, my health is an important (if not the most important) consideration
  - Sometimes it is difficult to find food that won’t make me ill, wherever I am
  - A healthy diet is important, but my allergy comes first
  - Food labels should help, but often hinder my food choices
  - My food choices are dominated by my allergy
- Eating requires organisation
  - Preparing and eating food takes time that I don’t always have
  - Forward planning is absolutely necessary
  - I buy what I usually buy because it is safer for me to eat
- Foods have a time and place
  - My eating habits depend on where I am
  - My eating habits depend on time of the day
- My cultural and social environment influences my food choices
  - Waste not, want not
  - My background shapes my eating habits
  - Ethical concerns somewhat influence my food choices
- Eat what you can afford
  - Price drives my food choices

HOW EATING MAKES ME FEEL
- Food, and the whole experience of eating, can be a source of pleasure
  - I would like to get more satisfaction and pleasure from food
  - Eating with other people is difficult

HOW TO EAT?

Adults without food allergies

WHY EAT?
- I just feel like eating
  - Food choices are influenced by the mood I am in
  - Eating because food is there
  - I eat when I am hungry
- When it comes to food, my health is an important (if not the most important) consideration
  - Striving to achieve a ‘healthy’ balance
- Eating requires organisation
  - Preparing and eating food takes time that I don’t always have
  - Forward planning is nice, but not all the time
  - I usually stick to a certain routine
- Foods have a time and place
  - My eating habits depend on time of the day
  - My eating habits depend on where I am
  - The weather influences what I eat
- My cultural and social environment influences my food choices
  - Waste not, want not
  - My background shapes my eating habits
  - Ethical concerns influence the way I think about food
- Eat what you can afford
  - Price drives my food choices

HOW EATING MAKES ME FEEL
- Food, and the whole experience of eating, can be a source of pleasure
  - Food gives me satisfaction or pleasure
  - The whole experience of food is pleasurable
  - Eating is most enjoyable with other people

Figure 3.5: Developed thematic map, showing three domains and seven overarching themes
3.4.2 Rigour of the present study

Many different concepts regarding standards of validation and evaluation in qualitative research studies exist. Those who take a realistic approach have established criteria that reflect quantitative evaluation strategies including validity, reliability and generalisability. The opposing view argues that qualitative research is not congruent with quantitative research and should therefore not be assessed with the same terms. In line with several authors (Mays & Pope 2000, Finlay 2006) who advocate applying selectively chosen criteria that are tailored to specific research ideals, this research project was evaluated using its ‘own’ checklist to ensure rigour on the basis of representativeness and interpretation of data.

One of the key aspects of qualitative research is transferability. Transferable findings are those that can be shared and applied to other contexts. According to Malterud (2001), this is achieved with a relevant sampling strategy that covers a wide range of opinion and views. To reflect this diversity within the population (Ritchie et al. 2003) a purposive sampling approach was employed for this study to recruit participants with a variety of experience. The reader is confirmed of the transferability of the findings by the variation of sample characteristics presented in the results section.

A quality standard in research closely linked to transferability is generalisation. In the view of Polit & Beck (2010), generalisation is ‘an act of reasoning that involves drawing broad conclusions from particular instances - that is, making an inference about the unobserved based on the observed’ (p. 1451). It is achieved by embedding research findings within a context and abstracting general concepts from the data. To ensure generalisation of the findings in this study, evidence on food choice behaviour of the general population was integrated into the analysis and presented in combination with the results.

Another criterion of good qualitative research as defined by Barbour (2001) is ‘multiple coding’, which can be seen as equivalent to the quantitative inter-rater reliability. Multiple coding is used for cross checking of coding strategies or interpretation of data; thus a complete replication of results is not necessary. In this study, a second, independent
researcher analysed a section of the dataset. The generated codes and subthemes from both of us were then compared and themes and their interpretation were refined in a joint discussion. The biggest advantage of this validation criterion lies in its capacity to encourage thoroughness of the data analysis process and in alerting researchers to all potentially competing explanations (Barbour 2001).

Lincoln & Guba (1985) formulated ‘credibility’ as one of their criteria evaluating trustworthiness of a research study. They consider ‘respondent validation’ or ‘member checking’ as the most critical way to establish it. Member checking incorporates the participant’s reaction into the study findings, which is seen as a useful tool to refine explanations. Participants of this study were involved in the data analysis process by verifying the accuracy of transcripts and by giving feedback on the emerging themes and subthemes.

The final criterion by which rigour in this study was ensured is reflexivity. Mays & Pope (2000) understand reflexivity as the influence that the researcher, a person with prior assumptions and experiences, has on the collected data. The personal and intellectual position of the researcher should be revealed as part of any qualitative report as it contributes to the interpretation of the findings, and making it explicit allows the reader to judge the potential impact of this on the findings. A personal account of my role as a researcher in this study can be found in Section 7.3.

### 3.5 Results

A total of 29 adults (12 food-allergic and 17 non-food-allergic) participated in four focus groups, two in each population sample. The higher sample size within the non-food-allergic group was a result of over-recruitment and unplanned attendance of some participants in the first discussion. The main characteristics of all participants are outlined in Table 3.1. Both groups included similar numbers of participants across age categories. There were more women than men enrolled in the study, but this equally concerned the food-allergic and non-food-allergic group. Non-food-allergic participants held higher qualifications than food-allergic participants. Around 90% of the study population was White. The majority of
them were following a diet that included meat. Among food-allergic participants, allergy to peanuts and tree nuts was most common. However, since 3/4 of them were suffering from allergies to more than one food, allergic reactions to a broad range of foods was reported.

The analysis generated three main elements that determine an individual’s food choice: (1) Why do I eat? (2) How eating makes me feel (3) How do I choose what to eat? These elements were subdivided into overarching themes and subthemes as displayed in Table 3.6 and described below.
Table 3.1: Characteristics of adults

<table>
<thead>
<tr>
<th></th>
<th>Adults with food allergies (n)</th>
<th>Adults without food allergies (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-34</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>35-49</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>50-65</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
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<tr>
<td>Female</td>
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<td>11</td>
</tr>
<tr>
<td>Male</td>
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<td>6</td>
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<tr>
<td><strong>Highest qualification</strong></td>
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</tr>
<tr>
<td>GCSE or A-level</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Degree level</td>
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<td>6</td>
</tr>
<tr>
<td>Postgraduate degree level</td>
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<td>9</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td>13</td>
</tr>
<tr>
<td>White European</td>
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<td>2</td>
</tr>
<tr>
<td>Indian</td>
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<td>1</td>
</tr>
<tr>
<td>Mixed</td>
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<td>1</td>
</tr>
<tr>
<td><strong>Type of diet</strong></td>
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<td></td>
</tr>
<tr>
<td>Omnivore</td>
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<td>14</td>
</tr>
<tr>
<td>Vegetarian</td>
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<td>3</td>
</tr>
<tr>
<td><strong>Culprit foods</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanuts</td>
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<td></td>
</tr>
<tr>
<td>Tree nuts</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
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<tr>
<td>Eggs</td>
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<td></td>
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<tr>
<td>Wheat</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Crustaceans</td>
<td>2</td>
<td></td>
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<tr>
<td>Fish</td>
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<td>Sesame</td>
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<td>Others</td>
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<td><strong>Avoidance</strong></td>
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<td>Single foods</td>
<td>3</td>
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<td>Multiple foods</td>
<td>9</td>
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Others included: Fruits, Coffee, Celery, Wine, Yeast, Soya, Gluten, Monosodium Glutamate, Salicylates, Barley, Oats
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<thead>
<tr>
<th>Domain</th>
<th>Influences</th>
<th>Themes</th>
<th>Food allergies</th>
<th>Subthemes by group</th>
<th>No food allergies</th>
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<td>Why do I eat?</td>
<td>Personal factors</td>
<td><em>I just feel like eating</em></td>
<td>Food choices are influenced by the mood I am in</td>
<td>Eating because food is there</td>
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<td>I eat when I am hungry</td>
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<td>How eating makes me feel</td>
<td>Personal and social factors</td>
<td><em>Foods, and the whole experience of eating, can be pleasurable</em></td>
<td>I would like to get more satisfaction and pleasure from food</td>
<td>Food gives me satisfaction or pleasure</td>
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<td>The whole experience of foods is pleasurable</td>
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<td>Eating with other people can be difficult</td>
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<td>Eating is most enjoyable with other people</td>
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<td>Resources</td>
<td>Eat what you can afford</td>
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<td>Price drives my food choices</td>
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<td>Preparing and eating food takes time that I don’t always have</td>
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<td>Forward planning is absolutely necessary</td>
<td>Forward planning is nice, but not all the time</td>
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<td>I buy what I usually buy because it is safer for me to eat</td>
<td>I usually stick to a certain routine</td>
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<td>How do I choose what to eat?</td>
<td>Eating requires organisation</td>
<td></td>
<td>A healthy diet is important, but my allergy comes first</td>
<td>Striving to achieve a healthy balance</td>
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<td>My food choices are dominated by my allergy</td>
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<td>Food labels should help, but often hinder my food choices</td>
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<td>Sometimes it is difficult to find food that won’t make me ill, wherever I am</td>
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<td>Personal factors and ideals</td>
<td><em>When it comes to food, my health is an important (if not the most important) consideration</em></td>
<td>My background shapes my eating habits</td>
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<td>My eating habits are influenced by other people</td>
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<td>Ethical concerns somewhat influence my food choices</td>
<td>Ethical concerns influence the way I think about food</td>
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<td>Waste not, want not</td>
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<td>The media influences the way I think about food</td>
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<td>My eating habits depend on where I am</td>
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<td>Social factors, ideals, and contexts</td>
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<td>My eating habits depend on time of the day</td>
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<td></td>
<td>Foods have a place and time</td>
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<td>The weather influences what I eat</td>
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Figure 3.6: Overarching themes and subthemes - adults
**Why do I eat?**

**Theme 1: ‘I just feel like eating’** The effect of emotions on eating behaviour is a well-established concept in the literature, demonstrating variability across individuals and emotional states in how people change their eating in response to emotional arousal (Macht 2008). In this study, a number of participants in both groups reported a link between eating habits and feelings. Feelings related to stress, boredom, happiness or sadness were thought to influence whether they ate at all and the type or amount of foods eaten. Many participants reported that they would treat themselves with food after a bad day.

> yeah if it's been a bad day sometimes you just want something you know which is very naughty you know something sweet or if you are feeling tired or emotional kind of thing you know the classic is to opt for chocolate isn’t it kind of thing? (Non-food-allergic)

Conversely, some food-allergic participants described difficulties finding foods they could treat themselves with as they often had to miss out on chocolate and cakes. Due to its allegedly mood enhancing properties, consumption of chocolate is a popular and widely consumed comfort food (Parker, Parker & Brotchie 2006).

> I find it really difficult to have comfort food. I can’t have chocolate, so when we say take out chocolate, and we take out biscuits and cakes and some alcohol, and your comfort food is an apple, it doesn’t really do the same as a bar of chocolate used to… (Food-allergic)

Members of all focus groups had found themselves in situations where they were eating foods because they were surrounded by them or they could not resist the temptation of certain foods. Rozin (2006) considers availability as the biggest determinant of food choice behaviour as ‘one does not eat what is not there’ (p. 19), and therefore cannot be tempted to
then you are like ohh but if a packet of crisps wasn’t open and wasn’t in you
know you wouldn’t even think about it but if you know something is there or
if you are at friend’s house and they are prepping something for a meal and
you’re stood talking to them and ahm piece of cucumber, piece of this kind
of thing [laughter] so it’s just yeah if the things are out there (Non-food-allergic)

Even though feelings played a role when choosing food, being hungry remained the main
reason for eating for the majority of participants within both groups.

… yeah like, if you need to have like enough energy later on,… or if you just like
have to eat enough to getting home and go and play, so that I don’t collapse…
(Non-food-allergic)

Emotions and state of hunger belong to personal factors, that are influences derived from
psychosocial and physiological traits (Falk et al. 1996). They reflect what is most salient and
meaningful to individuals in terms of their needs and motivations to eat, and are therefore
summarised under the domain ‘Why do I eat?’.

How eating makes me feel

Theme 2: ‘Food, and the whole experience of eating, can be pleasurable’ People seek to
eat things they like and that gives them pleasure. Liking is the experience or anticipation of
pleasure from the orosensory stimulation of eating a food (hedonic value or ‘palatability’) (Mela 2006). Eating, and the whole experience surrounding food, was considered a source
of satisfaction and pleasure for most focus group members. Taste, flavour, texture and ap-
pearance as well as cooking and consuming the food in a nice environment were considered
very important, even though the latter was not always feasible. The meaning of pleasure in
this context was therefore twofold.
I think I am quite a visual person when it comes to food. So really sort of how it looks and errm fresh, and actually the atmosphere, and errm you know a nice coffee place with a lovely, you know lovely pictures even around and you know and then lovely food. I think that really has a huge impact for me. (Non-food-allergic)

Experimental work by Lähtenmääki & van Trijp (1995) suggests that variety-seeking tendency is an independent determinant of food choice behaviour, which could be closely linked to what Mela (2000) describes as ‘boredom’ with foods. Food-allergic participants reported that they would struggle to find foods or a variety of foods that they could enjoy, especially those who had been diagnosed with food allergies as an adult.

I don’t think you enjoy your food as much as you did before you had your allergies… like you say lunch, you have a sandwich or you have your fruit, and now you have got bits of cardboard and very plain boring, so it’s not something you look forward to. (Food-allergic)

However, others had developed coping strategies in managing their food allergies. They stated that the deprivation of some foods had also opened their mind to a whole range of new foods they could eat.

I think I tend to be more imaginative though than a lot people think when I list the things that I can eat. Some people come, oh my god what do you eat, cause they are quite narrow-minded I think about what they eat, and actually I feel like I have more variety than they do, even that I have got less choice… (Food-allergic)

Debevec & Tivadar (2006) highlight the importance of joint eating to build connections and relationships between individuals. They portray food as ‘a social jelly, a substance that binds
people together and that separates them’ (p. 5). Sharing meals or eating in the company of others was regarded as the most pleasant way of consuming foods among the majority of non-food-allergic participants, although they reported that this would not always be possible in practice. Food would bring people together and was seen as the binding factor among friends and families.

*I think the whole ambience of, if you have people around, you know friends or family, it’s just that sort of all getting together and sharing the food, you’ve prepared it, taken you a lot of time and trouble to decide what you gonna have, well it might not have taken you a lot of time and trouble, but erm and just the whole as I said the ambience of having everyone around and . . . ah it’s a nice feeling I think* (Non-food-allergic)

Generally, food-allergic participants felt that they would experience a lot of difficulties when eating with other people. This would also affect the immediate social environment including family and friends in that they often have to cook separate meals for themselves. Social events could even become a burden.

*…you don’t go to Christmas parties because you can eat nothing on the menu.*

*So you just make an excuse and can’t go there.* (Food-allergic)

In the food choice process model, liking, pleasure and variety-seeking are classified as personal factors and the social aspect of eating as social factors influencing food choice behaviour (Falk et al. 1996). Here they are combined into the domain ‘How eating makes me feel’ as they all relate to the feelings individuals associate with food and eating.

**How do I choose what to eat?**

**Theme 3: ‘Eat what you can afford’** Consumer research, by taking the example of Mojduzka, Caswell & Harris (2001), shows that food prices and promotions have an influence on consumer food-purchasing patterns. Food prices are hotly debated in relation to rising
obesity and diabetes rates as they impact access to healthy foods (Drewnowski & Darmon 2005). Price was considered a big issue when choosing food in this study, regardless of whether focus group members had food allergies. A number of participants from the non-food-allergic groups indicated that they would look out for offers in supermarkets. Opinions within the food-allergic group diverged. Some did not feel that their food allergies would have an impact on their shopping bills, whereas others thought that this was exactly the case.

…but you know I do sort of limit myself that I think I guess in that way it [free from chocolate] might be more expensive but you could just as well buy a really expensive box of chocolates, but so it doesn’t you know, I wouldn’t say it’s more expensive erm overall but I like you say, you make those choices about the expensive important things to buy, but you just don’t buy very often. I think you’d do that if you didn’t have an allergy as well so. (Food-allergic)

Another respondent said:

Yes, everything is more expensive if you buy from the free-from aisle, and because you can’t buy ready meals or even a pizza, you have got to make everything from scratch. When you buy a pizza for £2 or whatever in [major supermarket], it’s gonna cost you £6 by the time you have got all the fresh ingredients, your gluten and wheat-free bases, and the time. It is more expensive. (Food-allergic)

The importance of price when choosing food is echoed in previous research where people rated cost as the second most important consideration after taste (Glanz et al. 1998). Streptoe & Pollard (1995) have further demonstrated that price is a particular big issue among people with low-incomes. Price comes under tangible resources in the food choice process model (Falk et al. 1996).
Theme 4: ‘Eating requires organisation’ People perceive available time in a different way, depending on their demands such as employment, roles, gender and income (Jabs & Devine 2006). Participants from all groups thought that preparing and eating food requires time and effort. They reported that work and other activities made it hard to cook meals from scratch, especially during the week.

…and also on time, because on the weekdays normally I don’t have time, much time for cooking ah so on weekends, myself and my wife use to … tend to cook food, and tend to have a planned meal or something on weekends, but on weekdays usually like in breakfast or something we just have cereals and milk so that time is not wasted, so time is a factor in choosing food (Non-food-allergic)

Planning food shopping and meals was perceived as nice and useful by many non-food-allergic participants. Those who claimed not to be very organised thought that it was something achievable.

I think I’d like to do more planning, that’s definitely my aim because it really annoys me. I am quite a spontaneous eater so I want, I think of what I want to eat tonight or, and then I go to the supermarket and I end up spending quite a lot of money… (Non-food-allergic)

However, for the majority of food-allergic participants, careful planning of food shopping and meals was essential and was therefore experienced as burdensome rather than enjoyable. Some expressed frustration with it:

Yeah it is hard. I always have to think about what I am doing before I cook, we sort of write up week menus, we sit down, the four of us together, and write our weekly meals so everyone can choose something, and I can sort of soya milk in,
potato or, you know, just chop and change things around. It is really hard; it is frustrating there isn’t it. (Food-allergic)

In addition, these focus group members described their shopping habits as being very consistent. Their allergy would limit their selection of foods in supermarkets, so they felt that sticking to familiar foods was easier, and more importantly, also safer.

I think that’s why you tend to buy the same things cause you…. if you know they are safe for you, and you know…unless it has got a new improved recipe on it… (Food-allergic)

Although non-food-allergic participants did not talk about steady shopping habits, their daily eating behaviour seemed to follow a routine that they only escaped from at the weekend.

Bisogni, Jastran, Shen & Devine (2005) conceptualises the knowledge and ability to organise, cook and prepare meals while keeping the costs down as ‘food management skills’. Although traditional meals are still seen as the ideal way of eating, mothers in the UK report that they try to save and buy time on various stages in the food preparation and cooking by the use of convenience foods (Carrigan, Szmigin & Leek 2006). Marshall (2006) argues that much of our eating is very ordinary and follows a certain routine, despite increased use of convenience foods and snacking behaviour. Routine would often be internalised and not be obvious to the individual. Within the food choice process model, skills, knowledge, and time are pooled as intangible resources influencing food choice decisions (Falk et al. 1996).

Theme 5: ‘When it comes to food, my health is an important (if not the most important) consideration’ For some people, health-related reasons can be a significant driver when deciding what to eat (Ree, Riediger & Moghadasian 2008). Identified health concerns include disease prevention or chronic illness management, weight control and bodily well-being (Furst et al. 1996). Health considerations are predominately influencing food
choice decisions in women due to stronger health beliefs and greater weight control than men (Wardle et al. 2004). The majority of participants from both groups considered a healthy diet important. However, there were differences among the groups in the importance attached to it. For the non-food-allergic participants, achieving a healthy balance was the major goal. There were different interpretations of what ‘healthy’ actually means.

_I tend to save all my calories for the weekend really [laughter] because I do have problem with weight. So I try to have a very stable regime during the week and then I spoil it as my treat over the Saturday and Sunday, and then back on the wagon so to speak on Monday_ (Non-food-allergic)

_That’s the other thing, everything has got in and out, red wine is bad for you red wine is good for you, chocolate if bad for you chocolate is good for you potatoes are bad for you potatoes are good for you and really where do you go, so I think you know something that makes you feel comfortable does not make you feel ill, variety, not too much of anything, but I think that’s the way I approach food and health and I don’t have any list of things that I will never eat, I adore chocolate and ... but I actually don’t eat it very much, maybe a couple of squares a week and I would be surprised if I eat more than that._ (Non-food-allergic)

Within the food-allergic group, opinions on healthy eating greatly varied. Some participants did not see a link between healthy diet and food allergies or believed their allergy increased their awareness of what they are eating, whereas others perceived that it was hard to get sufficient nutrients from their diet as their allergy restricted the choice of healthy foods.

_For me it’s just balance really you know trying to eat five fruit and veg, variety, that’s the thing and eat not too much fat and sugar, it’s nothing really to do with my allergy, it’s just a lifestyle choice isn’t it?_ (Food-allergic)
I try and eat healthy cause I wanna lose weight, but it's just hard, just try and eat obviously certain healthy foods I can't eat. That's why I have kind of chosen slim fast milk shakes. That's just simple and things I can have obviously milk and stuff that's in it, so I can have those. So at the moment that's all I am eating... (Food-allergic)

‘Balance’ as a guiding principle in food choice decisions has been previously reported (Paisley, Sheeshka & Daly 2001). Individuals also tend to have their own interpretations on what healthy eating means and how complex it is (Falk et al. 2001). A healthy eating attitude has been shown to be more affected by the health concern of consuming too many calories than the health concern of developing diseases (Sun 2008).

Regardless of whether participants of the food-allergic group were conscious of eating healthy foods or not, their food allergies remained their biggest health concern. It was the factor that food-allergic participants were most aware of when choosing food. One even said:

*I don’t think I really choose what I want to eat. I think I just buy what I was available that I can eat, and then try and work out on which day I can mix it up. The choice you know, so I don’t really choose.* (Food-allergic)

Food labels only played a significant role for the food-allergic participants. Although food labels are intended to ease the food selection process, it was often the opposite. Food-allergic participants consistently expressed dissatisfaction with the current labelling practice, especially in regard to ‘may contain’ labelling.

*And you can’t rely on the food labels cause they say maybe, may contain nuts, tree nuts, peanuts. What’s the probability? It’s just rubbish!* (Food-allergic)

Members from the food-allergic groups reported that they would sometimes experience difficulties in finding foods that were safe for them to eat. This was mostly the case when
the responsibility for catering was in someone else’s hands. Eating out or travelling could become a challenge. Consuming foods outside the home, therefore, always involved a certain risk.

I did exactly the same recently [decided not to travel to a certain country] I was thinking of going to Marrakesh and I spoke to my mother in London and she said oh cause they don’t speak great English and if you have a problem you wouldn’t be able to get your point across and they love their nuts, so that was straight away I wouldn’t go to Marrakesh then I go to, I mean in Germany I was ok because I speak German so I could explain to them the seriousness in it, Spain errm isn’t so bad you can just like you said you can just have meat . . . and again I’ve got the basic Spanish so I can tell them again that; it does kind of affect where you go. (Food-allergic)

Some participants of the food-allergic groups reported that they would test foods if they were uncertain whether the food was safe to eat or not.

…and then I follow sort of a bit of a policy that whenever anything is out in front of me that if you are out, I always take a tiny tiny amount of the first bit, and I sit there and I wait for a minute or two and see what happens, and that’s the only way you can ever feel. And of course, it might not be in that bit that you have eaten, but at least the whole meal, you have got an idea that’s gonna be safe or not. (Food-allergic)

Furthermore, some food-allergic participants noted that they would generally have difficulties in finding food they could eat, not only when away.

…and you can’t take a sandwich; you can’t take a wrap or whatever [for lunch] . . . (Food-allergic)
Food allergies belong to personal factors affecting the food choice process, which, as reflected in this theme, refer to the salient needs or preferences of individuals. Health considerations are categorised under ideals in the food choice process model. Ideals are standards or norms that people have learned through socialisation and acculturation about what and how one should eat. They are used for reference or comparisons by which people evaluate their food choices (Furst et al. 1996).

**Theme 6: ‘My cultural and social environment influences my food choices’** When making food choice decisions, no one stands outside a cultural and social world. The cultural and social environment influences the availability of foods, their costs, general attitudes to food, the meaning of food, and the way children should be socialised to food (Rozin 2006). Food experiences early in life have been shown to fundamentally shape current eating habits (Devine et al. 1998). Participants from both groups observed that their food choices are impacted by their cultural and social environment. These influences were very similar on a societal level since most participants shared the same ethnic background. Several members looked back upon their childhood, and noticed how much their upbringing had shaped their eating habits.

> yeah I believe it’s the same with most stuff in life though isn’t it, sort of natural and nurture you know a lot of it comes from your parents or from other people you are around errm so if you are around quite of wide like you have like a quite lot of or wide ethnic friends group you know and you go around to each other’s houses, you sort of have more different food and yeah I learn more about the culture about their food and stuff so that’s cause I was gonna say my parents were quite, they had their vegetable patch and like my mum always tried to cook healthy and always tried to have like yeah one vegetable meal a week and all the best so yeah it kind of follows, as do most things I would say (Non-food-allergic)

Since eating was considered to be most enjoyable with other people, many non-food-allergic participants also highlighted the mutual influence people would have on each other’s eating
habits. They noticed that they would often find themselves in situations where they would eat what everyone else is having. The immediate family would have the biggest impact.

\[\text{…with my immediate family it’s quite tricky actually, it’s a pain, it’s not particularly enjoyable, two of my children are incredible fussy, and I even think they actually got like a phobia of putting different things in their mouths, I think they must assume that it’s gonna choke them and it has to be in the right form and in the right colour and the right shape, it is completely ridiculous of course, but, so when it’s just the wife and I, we can have a nice time whether it’s going out or preparing food… (Non-food-allergic)}\]

Within families, the deepest concern seems to be about getting the children to eat, and mothers tend to take the role as a mediator between family food preferences as they still hold the main responsibility over food provision within the family, despite female empowerment and independence (Slater, Sevenhuysen, Edginton & O’neil 2012). Research has also shown that people eat more with friends and family than when alone (De Castro 1997), and that the quantities consumed are adjusted according to the body type of the other consumer (McFerran, Dahl, Fitzsimons & Morales 2010). However, food-allergic participants did not mention that others would influence their dietary behaviour in any way.

Ethical considerations around food such as local and organic produce, genetically modified foods, and animal welfare may affect food choice behaviour, predominately in consumers from higher socio-economic groups (Holt 1993). Concerns about ethical issues relating to food were discussed in both groups, but were most prominent in non-allergic participants, many of whom emphasised the influence of ethical considerations on their food choices.

\[\text{…recently we are trying to switch to the erm, to only buy local stuff, and then buy erm all the stuff in season. So that’s gone from me hating going to [major supermarket]. I am quite enjoying going to the greengrocers…}\]
However, other participants would not give great importance to it.

…it’s not a very major factor in my shopping (mumble) maybe because I lack knowledge on where the things come from… (Non-food-allergic)

Research shows that, although many people support ethical considerations in principle, they would not put them in practice as other factors would take over (Weatherell, Tregear & Allinson 2003). Participants from the food-allergic groups generally thought that ethical issues did not play a major role in their food choices, even though some had decided to follow a vegetarian or vegan diet.

I am lactose intolerant and, yeah and I have got a nut allergy, and have had since I was four, and I am a vegetarian as well, so I don’t eat meat but I do eat fish cause of my nut allergy. Otherwise I wouldn’t get any protein, but I only eat fish, probably quite limited, once a week or something… (Food-allergic)

Another topic that was considered by several focus group members included food wastage. Although this topic was hardly mentioned in relation to ethical concerns, many participants stated that they would eat leftovers.

…I tend to just look at what’s in the fridge, and I put whatever is in there in a Tupperware container and take it. So it’s normally leftovers and things like that. (Food-allergic)

The media is an important source of information about diet and food (Pollard, Kirk & Cade 2002). It is a powerful tool in that it can make people think about what they eat
(Reilly 2006), but also in that it provides a platform for food advertising, which according to Caraher & Landon (2006), has a big impact on food choice behaviour although it is not fully understood how. A number of participants from the non-food-allergic, but not the food-allergic groups, noted that the media would influence their food choice decisions in a two-fold way - consciously and unconsciously.

It’s also really annoying if you go to a cinema or you are watching movies with your friends [...]. If you watch the telly, every single offer break starts with a food and you have then enough time to move to the kitchen, pick up something and start chewing. (Non-food-allergic)

This theme is embedded in several categories of the food choice process model. The impact of relationships on food choice decisions is reflected in social factors. Ethical considerations refer to ideals derived from cultural and symbolic factors that people associate with food. The impact of mass media on food choice decisions is classed with contexts. Contexts are the larger environments in which food choices are made, and encompass the societal food system and physical surroundings (Furst et al. 1996).

Theme 7: ‘Foods have a place and time’ Eating takes place in a context and consequently the physical surrounding as well as time of the day appear to influence food choice behaviour. Out-of-home consumption has been associated with a larger caloric intake in comparison with eating at home (Stroeble & De Castro 2004). There was a general agreement across both groups that eating habits would differ depending on the location. Dietary habits, as compared to home, would change when at work, at restaurants or other food places, and particularly when travelling. One participant said:

I think it depends where you are as well like ahm I try and eat like local speciality wherever we were like you know whatever is places … like sort … I wouldn’t buy a cream tea around here whereas at my grandparents down in Devon then I would or you know if I was in somewhere else whatever’s local
Besides the location, time of the day was also regarded as an influential factor for food choices. People seem to have a tendency to consume certain foods at certain times of the day, depending on their experiences and associations with certain meals and times (Stroeble & De Castro 2004). Some participants mentioned that eating would structure their day in that they would know when their breaks where going to be. Those who worked night shifts found it hard to have regularity in their eating habits.

\[\ldots\text{I work night shifts as well, so it's sort of been a bit of a mishmash with things}\ldots\] (Food-allergic)

Again, this observation did not differ between the groups.

Season can constrain the availability of certain foods (Furst et al. 1996). Members of the non-food-allergic groups, but not food-allergic groups, noticed that seasons and weather would influence their food choices. For some, this was also linked to mood as illustrated by one participant:

\[\text{I think if you, like just winter, and it's all miserable outside as well, and it's like late in the evening I'd rather, yeah like be watching a film, and you'd have like a pack of Doritos or some like sort of nice like treaty foods I suppose then.}\] (Non-food-allergic)

Location and climate influences refer to physical surroundings influencing food choice behaviour and are therefore part of the context category in the food choice process model (Furst et al. 1996).

Themes 3-7 are summarised under the domain ‘How to choose what to eat’. They
represent ‘external’ influences involved in the food choice process and are not related to individual needs or the effect that food has on individuals.
3.6 Discussion

This qualitative study is the first to explore the attitudes, behaviours, beliefs and experiences that inform food-allergic adults’ food choices. Its comparative design highlights agreements and key differences between food-allergic and non-food-allergic adults. With this knowledge, gaps in this research area regarding the dietary management of food allergies in adults are addressed. As recently reviewed by Skypala (2011), there is a paucity of research in the adult food-allergic population.

The focus groups revealed three elements: (1) Why do I eat? (2) How eating makes me feel (3) How do I choose what to eat? Plus a number of themes that determine an individual’s food choices: ‘I just feel like eating’; ‘Food, and the whole experience of eating, can be pleasurable’; ‘Eat what you can afford’; ‘Eating requires organisation’; ‘When it comes to food, my health is an important (if not the most important) consideration’; ‘My cultural and social environment influences my food choices’; ‘Foods have a place and time’. Agreements and differences between the groups were observed for all domains, although some aspects of food choice behaviour were more affected by food allergies than others.

3.6.1 Review of findings in light of existing literature in food allergy research

As can naturally be expected, food-allergic participants did not differ from non-food-allergic participants in their motivations or reasons for eating. However, participants with food allergies reported a lack of pleasure or satisfaction from food and the experience of eating. This was also associated with the variety of foods they could eat. Although the onset of food allergies was not explicitly assessed, it was notable that those who had been diagnosed later in life seemed to find it difficult to enjoy foods in the same way as they did before they became allergic. It is therefore important to help adults who receive a diagnosis of food allergies explore new foods and dishes they can eat, in order for them to maintain a varied diet.
Almost all participants thought that eating was a social activity, and that sharing meals had positive effects on relationships. Many food-allergic group members stated that their food allergies compromised their social life, in particular with people other than family and immediate friends. This is in accordance with the finding that food-allergic adults rate their social activities on quality of life scales lower than the general population (Flokstra-de Blok et al. 2010, Primeau et al. 2000). It should not be underestimated how many social problems a food allergy can bring with. As eating is a socially-related event, its biggest enjoyment aspect is that of being in the company of others. Consequently this issue needs to be addressed, and efforts should be made to give food-allergic adults the confidence of having meals with other people.

In line with a previous study (Voordouw et al. 2009), food-allergic adults were divided on whether their food allergies would impact on their total grocery costs or not. Those who felt it did believed that higher expenses were a result of the necessity to buy ‘free from’ products and fresh ingredients instead of ready meals. Amongst those who took the opposite view, spending money was regarded as being relative to what you are willing to pay for food, with food allergies playing an insignificant role in it. These results suggest that dietary advice should be given in the light of monetary constraints, since food allergies could pose a financial problem for low-income populations.

The majority of food-allergic participants found themselves forced to prepare and organise their meals in advance. They missed spontaneity in their eating habits, and would experience situations where they missed out on foods due to lack of forward planning. On the contrary, some of the non-food-allergic participants liked to plan their meals, and did not experience it as a burden. Therefore, education for food-allergic patients relating to the practice of organising and planning meals might also be important. This could involve special cooking classes for adults with food allergies, in which they gain knowledge and skills in planning and preparing foods, not only for at home but also to take away. With the increasing use of convenience foods, it might also be important to show how meals can be cooked from scratch. A key aspect seems to be to get routine into people’s daily eating
habits, which also involves meal planning and cooking.

A similar pattern was observed in terms of shopping habits. Whereas many non-food-allergic participants would observe a routine in their eating habits, some food-allergic adults perceived their selection of foods in supermarkets to be limited, and sticking to familiar foods and brands was one strategy to reduce the risk of reactions. A preference for supermarkets and brands has also been reported in a recent study on nut allergic consumers (Barnett, Leftwich, Muncer, Grimshaw, Shepherd, Raats, ... & Lucas 2011b). Despite the importance of consistency within food labelling practices, it might also be useful to give adults with food allergies advice on shopping strategies so it is easier for them to get routine into shopping habits as well.

A number of participants across both groups showed increased awareness about healthy eating habits. However, among food-allergic participants, their allergy had clear priority over other health issues. Finding safe foods was often a challenge, in particular when eating out and during travelling. Their experiences conform to those reported in the literature Leftwich et al. (2011) and include incorrect information provided by restaurant personnel, the feeling of not being understood or taken seriously by them, and language difficulties when travelling abroad. Although the focus has to be on the successful management of food allergies, the importance of a healthy diet to prevent other chronic diseases should not be neglected.

Food labelling mainly played a role within the food-allergic groups. Participants were consistently dissatisfied with current labelling practice, and thought that food labels often made food choices more complicated rather than easier. The risk of accidental exposures due to inappropriate food labelling is well known (Sheth et al. 2010) and food-allergic consumers’ experiences with food labels have been investigated as part of the Europrevall project (Cornelisse-Vermaat et al. 2008, Voordouw et al. 2009) and by a UK research group (Barnett et al. 2011a,b). They all emphasise the need to harmonise current labelling practices in order to prevent unnecessary dietary restrictions. These include standardisation of format
and traceability of ingredients. Recent research (Voordouw, Cornelisse-Vermaat, Pfaff, G, Niemitz, Linardakis, Kehagia & Frewer 2011, Voordouw, Antonides, Cornelisse-Vermaat, Pfaff, Niemitz & Frewer 2012) suggest the use of symbols, handheld electronic scanners and information booklets as solutions to improve the delivery of food allergies information. Additionally, consumer education on the necessity of label reading at all times is central.

Only slight differences between non-food-allergic and food-allergic members were observed in terms of the environmental factors (‘My cultural and social environment influences my food choices’; ‘Foods have a place and time’) that were identified to affect an individual’s food choice. It was notable that food-allergic adults did not report that they would be influenced by other people’s eating habits. An observation that might demonstrate how many social difficulties that are related to eating that adults with food allergy experience. Similarly, they did not think that the media was affecting their food choice behaviour. This could either be due to the fact that their allergies make them less susceptible to information conveyed in media and food advertising, or simply because it was not felt as an issue during the focus group discussion. In terms of ethical issues, non-food-allergic adults showed to be the more conscious group. It seems that for food-allergic respondents their food allergies are such a prominent consideration in their food choice decisions that they do not give much value to ethical concerns. The influence of season or weather on food choices varied among participants in general, but might be less obvious for food-allergic adults. Although all these factors around food choice behaviour did not seem central to the food-allergic participants of this study, the possibility that modifications of the, for example, social environment could contribute to the successful food allergy management, should not be overlooked.

3.6.2 Theoretical considerations

This study is theoretically embedded in the food choice process model developed and evolved by Falk et al. (1996), Furst et al. (1996), Connors et al. (2001) and (Sobal & Bisogni 2009). The model seeks to be a comprehensive representation of the food selection process and aims to fully reconstruct how food choice decisions are made, which lies beyond
the scope of the present study. However, one major component of the food choice process model - ‘influences’ - guided the generation, analysis and interpretation of the data. Furst et al. (1996) identified five categories of influences on food choice decisions: cultural ideals, personal factors, resources, social factors and present contexts (Chapter 2, Figure 2.5). Although one could argue that the themes represent food choice values that are constructed in the personal food system that according to Falk et al. (1996), Furst et al. (1996), Connors et al. (2001) and (Sobal & Bisogni 2009) each individual develops, it needs to be emphasised that the aim of this study was to identify attitudes, behaviours, beliefs and experiences that influence food choice behaviour, rather than to reproduce how food choice decisions in particular situations are made. Therefore, the component ‘influences’ and not ‘personal food system’ of the food choice process model was chosen as the theoretical framework for this study. However, investigating food choice behaviour among adults with food allergies through the perspective of the two other major components of the food choice process model, life course event & experiences and personal food system, would provide new avenues for future research. It would be interesting to find out how food choice behaviour changes due to the diagnosis of food allergies (part of the life course event & experiences), and how it leads to a redefinition and renegotiation of food choice values (part of the personal food system) in the context of their current life.

3.6.3 Strengths and limitations

This study is the first to investigate the effect of a food-allergic condition on individuals’ food choices. It addresses a long neglected gap in an often neglected age group within food allergy research. Previous research studies have mainly focused on barriers for food-allergic consumers when eating out or shopping (Leftwich et al. 2011, Voordouw et al. 2009) but have never sought to look into the underlying influences on food choice behaviour. With the use of a qualitative approach, a better understanding of these influences could be provided.

The focus group design enabled the collection of a wide range of opinions and views whilst highlighting differences in perspectives of individuals (Finch & Lewis 2003). Even though this study did not intend to explore very sensitive and personal issues, it is possible
that some participants found the focus group situation intimidating or felt pressurised to agree with the dominant view. Following the recommendations of Krueger & Casey (2000), the moderator tried her best to integrate every participant into the discussion and to create a pleasant and comfortable environment so that all focus group members could contribute their opinions and beliefs. The group dynamic and atmosphere was perceived as positive in all focus groups and it was relatively easy to initiate the flow of the discussion. The participants were generally very talkative, which could also be explained by the fact that the topic was one that was relatively easy to speak about. In the focus groups with food-allergic participants, situations occurred where members started discussing other issues related to food allergies but not relating to the main topic of the research. Knowing that they were asked to talk about their food allergies made them automatically the foremost issue of the discussion. However, I endeavoured to keep the discussion relevant and focused by the use of prompts to obtain the information required.

Another strength of this study was its comparative design. By contrasting food-allergic adults to their non-allergic ‘controls’, issues that concern only these groups can be highlighted. At the same time, studying food choice behaviour of the general population embedded this research within society and provides explanations for food choice behaviour among food-allergic participants that could not have been obtained by examining food-allergic participants alone. Furthermore, the food choice process model was chosen as the theoretical framework for this study as it leads to an understanding of how individuals make food choice decisions from multiple perspectives including psychological, cultural, biological and economic factors (Furst et al. 1996, Sobal & Bisogni 2009). This means that this study intended to provide a comprehensive presentation of what factors influence food choice behaviour of adults with food allergies, not only from their psychological viewpoint. It therefore needs to be emphasised that this research does not show how food-allergic adults ‘think’ their allergy influences the way they eat.

This study is not without limitations. As is common in qualitative research, the sample size was relatively small. Nonetheless, all influences of food choice based on the food
choice process model were identified. Also Krueger & Casey (2000) considers three or four focus groups sufficient to answer a simple research question. With a larger sample size, it would have been possible to look into differences in food choice behaviour between sub-sets of participants such as age, gender, ethnicity, socio-economic status, type of allergy, severity of symptoms and time of diagnosis. As has recently been highlighted, it is important to address gender differences within food allergy research (DunnGalvin, Hourihane, Frewer, Knibb, Elberink & Klinge 2006). Another potential limitation of this research relates to how participants were recruited. Food-allergic participants were selected through a local hospital and support charity, and therefore might not be representative of the whole food-allergic population. All other focus group members were approached through advertising on the University website, which may have attracted health-conscious, predominantly female participants with higher qualifications. It is possible that food-allergic participants who volunteered to take part in the study had a greater interest in food allergies as such, and perhaps it affected their food choices more than that of the general food-allergic population. This could provide an explanation as to why food-allergic participants mainly tended to speak about their food allergies, which could have overshadowed other influences on their food choices. Likewise, non-food-allergic participants were ‘self-selected’ and the perspective of food choice behaviour presented here could mainly be that of women of higher socio-economic status, who are more interested in healthy eating, have more monetary resources for food available, and perhaps see eating more as an act of pleasure rather than a necessity, compared to other people. Although all participants might not be fully representative of their population, the findings are indicative of a number of factors that impact on food-allergic adults’ food choices.

Finally, it could be argued that this study only included adults who had a diagnosis of food allergies and not those with other adverse reactions to food that are also classified as food hypersensitivities. This population was indeed included in this study, but due to the fact that this research aimed to investigate food choice behaviour and dietary intake of the food-allergic population, its findings are not presented here, but have been published elsewhere (Sommer, Mackenzie, Venter & Dean 2012) (Appendix 0.1).
3.7 Conclusion

To conclude, food-allergic and non-food-allergic adults show similarities and differences in their food choice behaviour. Participants with food allergies did not differ from those without in their motivations or reasons for eating, health awareness, monetary considerations related to food choices and cultural and environmental influences on eating habits. In contrast with non-food-allergic participants, food-allergic participants did not feel that they got satisfaction and joy from food, had difficulties sharing meals, and felt the need to organise their eating. It is important to offer patients with food allergies advice that goes beyond avoidance of foods. The social aspect of eating should also not be neglected. Healthcare professionals such as dieticians should consider personal and environmental circumstances when giving dietary advice, and educate patients not only on appropriate avoidance of foods, but also on alternative foods that can be consumed. A central issue is to get routine into the diet of adults with food allergies. Future directions for research studies include the investigation of individual food allergies, severity of symptoms as well as age, gender, socio-economic status, and ethnicity of adults with food allergies and their effect on food choice behaviour. Since time of diagnosis has shown to have an effect on present food choice behaviour, examining food choice behaviour of adults with food allergies using the full food choice process model including the life-course perspective and the personal food system would give a better insight into how food choice behaviour changes after a diagnosis of food allergies.
Chapter 4

Food choice behaviour of teenagers with food allergies

4.1 Overview

In this chapter, the impact of food allergies on food choice behaviour among teenagers is studied. With a qualitative approach, attitudes, behaviours, beliefs and experiences that shape the way teenagers choose their food is explored. It further demonstrates differences and similarities in influences on their food choice behaviour to non-food allergic teenagers using a comparative research design. Data was generated under the theoretical concept of food choice and eating behaviour among teenagers. The findings are discussed with respect to health-related quality of life issues for teenagers with food allergies.

4.2 Background

4.2.1 Rationale for the study

Adolescence is a period of physical, developmental, and social changes, which can notably affect a young person’s food choice behaviour and nutritional health (Spear 2002). Whilst parents play the most important role in shaping eating habits during childhood, their influence gradually diminishes and children start to gain more control and autonomy over their food choice in a search for their own identity (Bassett et al. 2008a, Warren et al. 2008,
Teenagers strive for acceptance of their peers and their social norms and attitudes towards food impact food preferences and patterns (Dennison & Shepherd 1995, Contento et al. 2006). Concern with body image and the desire to be thin tempts them to make food choices believed to accomplish this goal (Hill 2002). Food choice behaviour in adolescence is particularly important as behavioural patterns acquired during this time are likely to persist into adulthood (Kelder, Perry, Klepp & Lytle 1994).

Teenage food choice behaviour is influenced by a range of individual, interpersonal, physical environmental and societal influences (Larson & Story 2009, Story et al. 2002). Story et al. (2002) has integrated them into a theoretical framework for determining factors influencing adolescent food choice behaviour. The model rests on social cognitive theory (SCT) and ecological theory and consists of four levels of influence: individual influences, social environmental influences, physical environmental influences and societal influences. Individual influences include psychosocial, biological, behavioural and lifestyle factors. Social environmental influences refer to interpersonal relations within the family, with friends, neighbours and acquaintances. Physical environmental influences are those that impact accessibility and availability of foods within the community. Societal influences play are more distant and indirect role in determining food choice behaviour and include mass media and advertising, social and cultural norms of eating.

Food allergy can be an additional factor influencing adolescent food choice behaviour. Teenagers with food allergies are advised to avoid allergenic foods depending on the level of avoidance required (Venter & Meyer 2010). Management of food allergies involves careful label reading, adaption of recipes, prevention of cross-contamination, and increased alertness when eating away from home (Muñoz-Furlong 2003, Venter & Meyer 2010). During adolescence, the responsibility for allergen avoidance is handed over from the parents to the young person, which can cause anxiety and stress on both sides (Akeson, Worth & Sheikh 2007, Lebovidge, Strauch, Kalish & Schneider 2009, Lyons & Forde 2004, Mandell, Curtis, Gold & Hardie 2005). As recently shown, independence and social well-being are among the foremost issues in terms of health-related quality of life in
food-allergic teenagers (MacKenzie, Roberts, Van Laar & Dean 2012). Reduced parental oversight tempts some teenagers to engage in risk-taking behaviour in the management of their food allergies (Monks, Gowland, MacKenzie, Erlewyn-Lajeunesse, King, Lucas & Roberts 2010, Sampson, Muñoz-Furlong & Sicherer 2006), and indeed, teenagers are the highest risk group for fatal, food triggered anaphylactic reactions (Pumphrey & Gowland 2007). Previous studies have explored the experiences of teenagers with food allergies (MacKenzie, Roberts, Van Laar & Dean 2010, Marklund, Wilde-Larsson, Ahlstedt & Nordström 2007), the psychosocial impact of food-induced anaphylaxis (Akeson et al. 2007), and the practical challenges teenagers with food allergies face (Monks et al. 2010). These studies, however, do not specifically illuminate how food allergies affect the eating habits of teenagers. There is a need to identify in which ways food choice decisions of teenagers are informed by their allergies so that their dietary management can be improved. Thus, the purpose of the present study is to gain insight into the food choice behaviour of food-allergic teenagers, from their own perspective, using a qualitative approach.

4.2.2 Aims and objectives

The principal aim of this part of the research programme was to explore the attitudes, behaviours, beliefs and experiences that influence food choice behaviour of teenagers with food allergies.

The following objectives were set to meet this aim:

- To gain knowledge of the factors influencing the food choice behaviour of teenagers with food allergies.

- To gain knowledge of the factors influencing the food choice behaviour of teenagers without food allergies.

- To compare factors identified by teenagers with and without food allergies in order to explore potential differences in the food choice behaviour between the two groups.
4.2.3 Rationale for a qualitative approach

The rationale for the use of a qualitative approach was previously described in Section 3.2.3.

4.3 Method

The study design is shown as a flow chart in Figure 4.1 and further delineated in the following sections.

4.3.1 Sample

The sampling strategy and sample size were based on the same rationale as in the study on food choice behaviour of food-allergic adults (Section 3.3.1). Using the stratified sampling strategy of Patton (2002), two sets of population samples - food allergic and non-food allergic teenagers - were purposely selected. Within each strata, a maximum variation of age, gender, socio-economic status, and for those with food allergies, a range of offending foods was targeted. Similarly to the adults, this was achieved by creating a sampling grid in which these key characteristics were mapped out. Potential participants were included in the study if they were aged 12-18 years old. Teenagers with food allergies had to meet the following criteria:

- IgE or non-IgE mediated allergy to at least egg, milk, peanuts, tree nuts, sesame, crustaceans, fish or wheat.

- Diagnosis needed to be confirmed with a positive Skin Prick Test (SPT)/serum specific IgE results plus a convincing clinical history or a positive food challenge.

In addition, participants were excluded if they were suffering from another condition that had a marked impact on their dietary intake (e.g. diabetes). They also could not participate if they had language difficulties or a poor understanding of English.

4.3.2 Ethical considerations

Ethical approval for the study was obtained together with that of the adult study from the Southampton and South West Hampshire NHS Research Ethics Committee (A) in May 2010.
(Appendix 3.1). As this research study involved minors it was important to address some age-specific considerations. Information sheets were written in a language understandable for the lowest aged participants (Appendices 4.1 and 4.2). They were checked for readability using Flesch-Kincaid Grade and had a level of 7.8, which is considered age-adequate for 12-year-olds. Parent(s)/guardian(s) were first approached asking if they assented for their son or daughter to take part (Appendices 4.3 - 4.5). Written informed consent was provided by
teenagers themselves (Appendix 4.6 and 4.7) and in the case that they were under 16 years of age also from their parents (Appendices 4.8 and 4.9). Participants were informed of their right to withdraw at any time. Prior to the start of the study, I underwent a criminal record check to ensure the safety of the teenagers during data collection. In any situation, another adult was present or close by and at least one colleague at the University was informed about my location. In addition to these age-specific precautions, this research study was conducted adhering to the ethical principles as discussed in Section 3.3.2. Pseudonyms were used to protect the identity of the participants.

4.3.3 Recruitment

The study sample was recruited from local schools (Portsmouth, Southampton, Isle of Wight) and a national support charity (The Anaphylaxis Campaign). Additionally, participants from an earlier population-based cohort study on the Isle of Wight (FAIR study) (Pereira et al. 2005, Venter et al. 2006) were invited to participate. Local schools were contacted with a letter asking if they were happy for their pupils to be approached (Appendices 4.10 and 4.11). One school on the Isle of Wight, one in Southampton and one in Portsmouth agreed to collaborate. To ensure confidentiality and data protection, the schools established the initial contact with food-allergic teenagers they had identified in their school records (Appendices 4.12 and 4.13). To approach non-food-allergic teenagers, advertisements were placed in the school hall and in the school’s newsletter (Appendix 4.14). Pupils were told to speak to their tutor if they wanted to participate in the study.

Members of the Anaphylaxis Campaign were contacted via email asking for interest in taking part in the study. Participants of the FAIR study cohort included both food-allergic and non-food-allergic teenagers. The FAIR study was set up to establish the prevalence of food hypersensitivity on the Isle of Wight. Parent(s)/guardian(s) of 116 teenagers (24 with food allergies and 94 without food allergies) of the cohorts born between 1991-1992 (Pereira et al. 2005) and 1997-1998 (Venter et al. 2006) were contacted with an invitation letter (Appendix 4.4).
In all recruitment procedures, information packages were sent to the parent(s)/guardian(s) who were then asked to hand them over to the teenagers if they were happy for their son or daughter to take part (Appendices 4.3 - 4.5). The information package contained an invitation letter to the parent(s)/legal guardian(s), invitation letter to the teenager, information sheet, consent form(s), screening questionnaire, and a worksheet (Appendices 4.1 - 4.9, 4.12 - 4.13, 4.15 and 3.7). Those teenagers willing to participate were asked to return the consent form with their contact details and screening questionnaire in the stamped envelope provided.

A total of 45 teenagers consented to take part in the study. Once consent forms and screening questionnaires were received, they were reviewed and eligibility of participants was assessed. Participants were selected on the basis of their differing age, gender, socio-economic background and food allergies.

4.3.4 Focus groups / Interviews

4.3.5 Focus groups

Some of the data was collected using focus groups. According to Peterson-Sweeney (2005), focus groups are an attractive method for conducting research in disempowered populations, such as teenagers, who might be reluctant to speak in one-to-one interviews. The group experience could present a natural environment and encourage young people to communicate their ideas and opinions. Further aspects of this method are discussed in Section 3.3.4.

4.3.5.1 Procedure for focus group with teenagers

The procedure of the focus groups followed that described in Section 3.3.4.2. The focus group was organised in collaboration with one of the schools and took place in its meeting room during lunchtime. Conducting the focus group at this time and place prevented potential organisational difficulties and provided a familiar and comfortable environment to the participants. The participants were given free sandwiches, snacks and drinks by the school canteen, which they were allowed to bring to the meeting room. The pre-discussion time was used for friendly conversation to put the group at ease. During that time, number stickers according to seating arrangement were distributed, and teenagers were asked to
write down their favourite food on a sheet of paper. Each focus group session was recorded with a digital audio recorder. I was supported by an assistant who helped to organise the focus group and took field notes during the session.

The introduction, general discussion and closing was performed in a similar way as in the focus group with adults. Questions for the topic guide (Appendix 4.16) were informed by the theoretical model of Story et al. (2002) and by examples from the literature (Hargreaves et al. 2002, Neumark-Sztainer et al. 1999). They were modified on the basis of the PhD supervisors’ past clinical and research experience and formulated in an age-appropriate manner as determined by Flesch-Kincaid readability test. Similar to the focus group with adults, the discussion was initiated with the worksheet, followed by examples of favourite foods. At the end of the focus group, the teenagers were thanked for their participation and provided with gift vouchers. They also received a debriefing letter containing more details about the project and its purpose.

4.3.6 Methodological issues using focus groups

The mix of two data collection methods, focus group and interviews, arouse from practical difficulties as well as considerations in respect to age and gender differences that were reviewed after the focus group with non-food-allergic teenagers. For focus groups in young people, Krueger & Casey (2000) recommend to have an age range that is not more than two years. Heary & Hennessy (2002) raises the issue of gender differences and friendship groups among young participants, which might have an affect on the group dynamic and productivity of the discussion. The focus group was conducted at a school, it was mixed-sex, with students from similar years and the same peer group. Although I felt that the focus group discussion in this composition went well, it proved to be difficult to arrange one with food-allergic teenagers. Each school has only a few students with food allergies and organising a focus group with teenagers from different schools and areas in the evenings or at weekends did not seem feasible due to the personal commitments of the teenagers. It was also thought that younger teenagers would have been reluctant to contribute to a discussion with older participants, and that the lack of peer support would have put many teenagers off from com-
ing along. Under these circumstances, individual in-depth interviews were deemed to be a more appropriate data collection method.

### 4.3.7 Interviews

Qualitative interviewing is one of the main, and the most widely used, data collection methods in qualitative research (Silverman 2000). As formulated by Burgess (1984), interviews are a form of ‘conversation with a purpose’ (p. 102). This means that information is acquired in a conversational style, through active interaction between interviewer and interviewee around relevant issues and experiences (Mason 2002). The distinct difference between interviews and ordinary conversations lies in their purpose, their depth and the roles of researcher and participant. The purpose of research interviews is to produce knowledge. This is achieved through interaction of two unequal partners, since the interviewer defines and controls the situation. The interview goes beyond spontaneous everyday conversations as it intends to create in-depth knowledge using a careful questioning and listening approach (Kvale & Brinkman 2009).

After facing the aforementioned obstacles in conducting focus groups among the population studied, in-depth interviews were identified as an equally suitable method to answer the research question as they both have been previously used to study food choice behaviour (Bauer et al. 2004), albeit the fact that they generate different types of data. In-depth interviews differ to focus groups in their level of detail and depth, providing a more personal understanding of the issues explored (Lewis 2003).

In-depth interviews can be conducted in various ways. Semi-structured interviews are characterised by a flexible and fluid structure, but have a sequence of themes to be covered. The interviewer is open to change this sequence and ask questions, to follow-up what the participant says (Kvale & Brinkman 2009). The in-depth interviews from this study were semi-structured so that data was obtained at a similar depth to that produced in the focus group. This enabled me to combine focus group and interviews for analysis.
4.3.7.1 Role of the interviewer

As with focus groups, the interviewer’s skills ultimately affect the quality of data generated during the interview. Kvale & Brinkman (2009) defines the concept of research interviewing as a *craft* that requires skills, sensitivity, and knowledge. A skilled interviewer has the ability to verbalise and formulate questions using the right tone, content and context. Other aspects of interviewing skills include sensitive listening and establishing of good rapport with the participant. Bassett, Beagan, Ristovski-Slijepcevic & Chapman (2008b) highlight the importance of rapport building when interviewing teenagers. Creating a connection with teenagers can be achieved through shared cultural insight by which the interviewer demonstrates understanding and empathy. Since interview data is produced socially between interviewer and interviewee, knowledge of the research topic is crucial for following-up the interviewee’s answers (Kvale & Brinkman 2009). Legard, Keegan & Ward (2003) further consider a clear logical mind, good memory and curiosity as key requirements of qualitative interviewers.

I had experience of conducting focus groups with adults prior to this study. Additionally, I was mindful of the requirements for qualitative interviewers listed and continually tried to improve my interviewing skills throughout data collection. Similar to focus groups, I reviewed the interview process by listening to the recording and reflected on my performance after each interview. Areas for improvements, such as adding probes to the themes, were identified and I sought to enhance these during the next interview.

4.3.7.2 Procedure for interviews with teenagers

Participants were contacted by phone to arrange a convenient time and place for the interview. They were given the choice to be interviewed at their home, their school, or at the University of Portsmouth. Allowing teenagers to choose their interview space is essential for the outcome of the interview (Bassett et al. 2008b), particularly without their parents in the room as it might encourage teenagers to disclose matters they normally do not share with them (Mauthner 1997). Therefore, parents were asked to stay outside the interview room but to remain nearby for legal and ethical considerations. Nevertheless, should the
teenager request it, a parent attended the interview.

The interview process followed the stages described by Legard et al. (2003). Upon arrival, I introduced myself to the parents and the participant and engaged in a casual conversation to establish a good rapport with them. Once this had been achieved, I moved on to explain the purpose and context of the interview. I gave a brief summary of the main points of the information sheet and reaffirmed the participant of their confidentiality. The use of the audio recorder was explained and the teenagers were informed that they were allowed to stop the recording or the interview at any time. I also highlighted that no judgement over their eating habits would be made.

The interview protocol was developed from the topic guide used in the focus group (Appendix 4.17). Due to the different nature of focus groups and interviews, the interview protocol was redesigned in order to obtain both breadth of coverage across topics but also depth within each topic (Legard et al. 2003). According to Rubin & Rubin (2012), the interview protocol consists of main questions, probes and follow-up questions. The main questions of the focus group topic guide along with some probes formed the basis of the interview protocol to ensure that similar topics were discussed with all participants. Further probes and follow-up questions were constantly added during the course of data collection after reflection on previously conducted interviews. However, in order to maintain a participant led approach, they were only used when the flow of the interview got stuck.

At the beginning of the interview, I asked the teenager some personal details to help establish a relationship but also to collect important contextual information. The first main question was opened with the same worksheet as used in the focus group in order to create a flow for the interview. While we discussed the main topics, both from the protocol and those emerging, we also elaborated on each of them in depth. Here, I used probes and follow-up questions to elicit a more detailed and reflective description from the teenager. The teenagers were free to decide which level of information they wanted to share. Once I noticed some discomfort by the teenagers around a topic, I steered the conversation away...
from it or rephrased the question in a more gentle way. The interview was closed with me asking if there was anything else that the teenager felt it was important to mention. After the audio recorder was switched off, the teenager was thanked for taking part and received a £10 gift voucher. The value of their contribution to the research was emphasised, followed by a short debriefing about the purpose of the research project. I took notes of important aspects and impressions after each interview.

4.4 Data Analysis

Data analysis was performed using thematic analysis proposed by Braun and Clark (2006). This qualitative analytical method consists of six phases: (1) familiarisation with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, (6) producing the report. Details of this analytical approach are outlined in Section 3.4.1. The theory or conceptual model guiding the investigation and analysis was proposed by Story et al. (2002) and conceptualises adolescent eating behaviour as a function of individual and environmental influences (Chapter 2, Figure 2.5).

Both focus group and interviews lasted approximately one hour. The audio recordings were transcribed verbatim by an external transcription service. Hence, I checked through all interview transcripts for accuracy by listening to the recordings while reading the transcript. Participants of the interviews were sent a copy of the resulting transcript to verify that it agreed with the way they recall the interview. All of the interviewed teenagers returned their transcript without requesting any amendments. Transcripts from focus group and interviews were approached in the same manner. For the focus group, the so called ‘unit of analysis’ was the group; correspondingly the individual was the ‘unit of analysis’ for the interviews (Boyatzis 1998). The entire data analysis procedure was consistent with that described in the study on food choice behaviour in food-allergic adults and can therefore be read in Section 3.4.1.
4.5 Results

Twenty-five teenagers (aged 12-18 years) participated in this study (seven with food allergies and 18 without, of which eleven non-food-allergic teenagers participated in the focus group). At their request, two food-allergic teenagers were interviewed with their mother present. The characteristics of all teenagers can be found in Table 4.1. Teenagers with food allergies were slightly younger than those without, but they tended to be similar in terms of other characteristics. Although almost equal, there were in total more boys than girls enrolled in the study. On average, around 1/3 of mothers held qualifications higher than GCSE or A-level whereas around 2/3 of fathers were qualified at degree or postgraduate degree level. The vast majority of teenagers were White and followed a meat-based diet. Most of the teenagers with food allergies had reactions to peanuts and tree nuts although other allergies such as milk, eggs, sesame, and crustaceans were also indicated. Apart from one teenager, all of them suffered from multiple food allergies.

Six key themes affecting adolescent food choices emerged from the focus group and interviews (Table 4.2): Variety and Enjoyment of Food as Learning Process; Body Awareness, Feelings, and Temptation of Foods; Parental Control vs. Convenience; Eating as Social Experience; Routine, Traditions and Environment; and Knowledge Shapes Understanding of Foods. They were further divided into subthemes as discussed below.
Table 4.1: Characteristics of teenagers

<table>
<thead>
<tr>
<th></th>
<th>Teenagers with food allergies (n=7)</th>
<th>Teenagers without food allergies (n=18)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean age (years)</strong></td>
<td>14.3</td>
<td>16.0</td>
</tr>
<tr>
<td><strong>Gender (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>42.9</td>
<td>44.4</td>
</tr>
<tr>
<td>Male</td>
<td>57.1</td>
<td>55.6</td>
</tr>
<tr>
<td><strong>Highest qualification mother (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCSE or A-level</td>
<td>57.1</td>
<td>60.0</td>
</tr>
<tr>
<td>Degree level</td>
<td>28.6</td>
<td>13.3</td>
</tr>
<tr>
<td>Postgraduate degree level</td>
<td>14.3</td>
<td>26.7</td>
</tr>
<tr>
<td><strong>Highest qualification father (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GCSE or A-level</td>
<td>33.3</td>
<td>33.3</td>
</tr>
<tr>
<td>Degree level</td>
<td>50.0</td>
<td>41.7</td>
</tr>
<tr>
<td>Postgraduate degree level</td>
<td>16.7</td>
<td>25.0</td>
</tr>
<tr>
<td><strong>Ethnicity (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White British</td>
<td>85.7</td>
<td>94.4</td>
</tr>
<tr>
<td>Asian British</td>
<td>0</td>
<td>5.6</td>
</tr>
<tr>
<td>Mixed Background</td>
<td>14.3</td>
<td>0</td>
</tr>
<tr>
<td><strong>Type of diet (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omnivore</td>
<td>100</td>
<td>94.4</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>0</td>
<td>5.6</td>
</tr>
<tr>
<td><strong>Culprit foods (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanuts</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Tree nuts</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>1</td>
<td></td>
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<tr>
<td>Wheat</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Crustaceans</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Fish</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sesame</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Avoidance (n)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single foods</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Multiple foods</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Others included: Mango, Monosodium Glutamate, Dried Fruits, Lentils, Pulses
<table>
<thead>
<tr>
<th>Influences</th>
<th>Themes</th>
<th>Food allergies</th>
<th>Subthemes by group</th>
<th>No food allergies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual and social environmental</td>
<td>Variety and enjoyment of foods as learning process</td>
<td>I would like to try new foods but often it’s safer to stick to what I know I can eat</td>
<td>Trying new foods is part of growing up, but sometimes it’s also nice to stick to what you know</td>
<td></td>
</tr>
<tr>
<td>Individual, social environmental, societal</td>
<td>Body awareness, feelings, and temptation of foods</td>
<td>I eat differently nowadays but not because of my allergy</td>
<td>‘Party rings? – We don’t really have them now, do we?’</td>
<td></td>
</tr>
<tr>
<td>Individual, social environmental, societal</td>
<td>Parental control vs. convenience</td>
<td>‘I firstly choose foods because I like them and secondly to see if they contain nuts.’</td>
<td>‘There is always something about certain fruits that puts me off.’</td>
<td></td>
</tr>
<tr>
<td>Individual, social environmental and physical environmental</td>
<td>Food is fuel for me</td>
<td>Food is sometimes just around</td>
<td></td>
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<tr>
<td></td>
<td>My allergy doesn’t dominate my diet – I just don’t eat what I shouldn’t</td>
<td></td>
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<tr>
<td>Social environmental</td>
<td>Eating as social experience</td>
<td>I have discovered that the whole experience of foods is enjoyable</td>
<td></td>
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<tr>
<td></td>
<td>My parents have a lot of control over what I eat, but sadly not forever!</td>
<td>My parents have a lot of control over what I eat, but not for long!</td>
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<td></td>
<td>Why would I bother making food if I don’t have to?</td>
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<td></td>
<td>What I eat, depends where I am – outside home I have to be more careful</td>
<td>What I eat depends where I am – outside home I am the boss</td>
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<tr>
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<td></td>
<td>What I eat, depends where I am – outside home I have to be more careful</td>
<td>What I eat depends where I am – outside home I am the boss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual, societal and physical environmental</td>
<td>Routine, traditions and environment</td>
<td>Eating can be a social event when I feel comfortable with people</td>
<td>Eating can be a social event but also social pressure</td>
<td></td>
</tr>
<tr>
<td>Individual and societal</td>
<td>Eating as social experience</td>
<td>If I ate with friends, I would like to have similar foods</td>
<td>If I ate with friends, I would have snacks or fast foods</td>
<td></td>
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<tr>
<td></td>
<td>Eating would be easier if I wasn’t depending on other people</td>
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<tr>
<td></td>
<td>Routine</td>
<td>It’s all about routine</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>‘We always have a roast on a Sunday’</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Cold foods in summer, hot foods in winter</td>
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<td></td>
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<tr>
<td></td>
<td>Knowledge shapes understanding of foods</td>
<td>Food is about more than just me</td>
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<td></td>
<td>Food has to be good value for money, especially if I have to pay myself</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>The media rarely influences what I eat</td>
<td>The TVs told me all I know about food</td>
<td></td>
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</tbody>
</table>

Figure 4.2: Overarching themes and subthemes - teenagers
Variety and Enjoyment of Food as Learning Process

A varied diet is important for ensuring adequate macro- and micronutrient intake needed to sustain life. Food variety seeking has been shown to be an influencing factor on food choice decisions (Lähtenmääki & van Trijp 1995) as well as a stable behaviour that is tracked throughout childhood (Skinner et al. 2002) into adulthood (Nicklaus et al. 2005). The food repertoire expands during adolescence due to increasing autonomy and their desire to enter the adult world (Ton Nu, Patrick MacLeod & Barthelemy 1996). The majority of teenagers from both allergic and non-allergic groups considered varying their food choices and learning to enjoy foods to be a part of growing up. Many would purposely try new foods to widen their palate, which they often referred to as ‘being adventurous with foods’:

I think I had horse meat when I was in Italy. It was alright actually, my dad had goat [laughs] and me horse, I was gagging, but we just picked it because we’re quite, I don’t know, adventurous with foods, so we just thought, why not. I didn’t get ill so. (Focus group member, Non-food-allergic)

However, seeking dietary variety contrasts with a tendency to reject unfamiliar and unknown. Food neophobia is an individual but also a socio-cultural trait (Flight, Leppard & Cox 2003). Indeed, not all teenagers, independent of the food-allergic condition, felt very confident in trying new foods. Some mentioned that they wanted to have the possibility to eat foods they were familiar with whenever they preferred to. Familiarity proves to be a strong predictor for food preferences (Birch 1979). Other teenagers reported that they struggled to increase the variety of foods they were consuming. Most of the food-allergic teenagers stated that they were cautious with trying new foods, especially when outside their home and on holidays abroad. As a consequence, they chose foods that were safe for them to eat or relied on parental judgement. A few thought their allergy hindered their ability to vary their diet, to be adventurous with foods, and to enjoy foods. While some teenagers had learned to cope with their situation, others would develop a fear of new foods or feel obliged to like foods they could eat:
I: Do you consider yourself picky?
R: Um, no but I think that’s coz I feel guilty when I don’t like something I sometimes feel I like I have to like it because, you know, it’s hard to find, I probably won’t find it again so, there have been times when I have been at school and I haven’t liked what they’ve given me, but I feel like I have to, which may sound not right but I guess that’s something, I’ve got into my mind. (Emily, 12 years, Food-allergic)

Food choice is a dynamic behaviour that is changed or modified throughout the life-course (Sobal & Bisogni 2009). The majority of teenagers from both groups noted that their eating habits had changed over the years. They either would eat similar but bigger amounts of foods than when they were younger or they had included a number of new foods in their diet. Those food-allergic teenagers who believed their diet had changed highlighted that this had nothing to do with their allergies.

...well the food changed anyway from liking different flavours, not because of allergies, I reckon if I found out I had an allergy now I’ve been eating different foods enough to change my diet but having it that early on just got used to it, it doesn’t really make a difference, never really had a difference though, so I don’t know. (Ryan, 13 years, Food-allergic)

Children and teenagers do not eat the foods they do not like (Birch & Fisher 1998), and taste and appearance of foods have been found to be crucial factors in teenage food choice decisions (Neumark-Sztainer et al. 1999, Norton, Falciglia & Ricketts 2000). Taste, smell, texture and presentation of foods also seemed to be the most important reason for choosing food among the teenagers in this study, both food-allergic and non-food allergic ones.

R1: There is always something about certain fruit that puts me off, like, there is only, I can eat strawberries, strawberries are ok but bananas, they sort of make
your mouth or teeth go all weird and...

R2: Like dry and...

R3: Yeah, like a bit furry, apples... apples they hurt to eat for a while, they sort of get...

R4: Yeah, chewing...

R5: Orange has like the white bit that you can't get anything out of... (Several focus group members, Non-food-allergic)

Eating fulfils biological needs and, from a physiological perspective, humans initiate eating in response to signals of hunger to maintain energy stores (Cummings & Overduin 2007). Hunger is often stated as a reason for choosing food (Neumark-Sztainer et al. 1999). Many teenagers felt it was important that foods provide them with energy to keep them going through the day.

...and then snacks after dinner and that I have more crisps, more chocolate and sometimes I have some pasta and stuff as well but not always coz I don’t get through a lot of my dinner, it fills me up for a little while and then I’m quite hungry again throughout the night, so yeah, I just snack pretty much... (Sara, 18 years, Non-food-allergic)

The majority of those who had food allergies emphasised that their allergy came second to liking as a motivation for choosing foods.

*Just, if I like it or not, I’ll just like see what I like and then see if it’s got nuts in it, first, I won’t pick it all out with nuts first...* (Ryan, 13 years, Food-allergic)

Although their food allergies deprived them from certain foods, food-allergic teenagers had accepted their situation and did not have a desire to consume the foods they were allergic to. Furthermore, most food allergic teenagers clearly stated that their food allergies did not
dominate or that they did not let their food allergies dominate their diet.

…I just kind of see it as an allergy. I don’t think they dominate the stuff that I eat. I can deal with the reactions, so I don’t really eat what I shouldn’t. (Jack, 17 years, Food-allergic)

Only those who had to give up their favourite food said that they would miss it.

I: So do you remember how nuts taste?
R: Um, I think they taste like metally, you have like metal in your mouth they taste really unpleasant, you can normally tell straight away.
I: So it isn’t something that you would like eat?
R: No.
I: That you miss?
R: No coz it tastes so horrible when you eat it so I don’t really miss it, but I always want to eat Nutella though, that’s the one thing that I miss, coz I love Nutella… (Ben, 12 years, Food-allergic)

Another aspect of food and eating that some teenagers from both groups had discovered was that the whole experience of food as such, which involved preparing and sharing meals, as well as eating out could be enjoyable. Indeed, many teenagers report involvement in food preparation (Larson, Story, Eisenberg & Neumark-Sztainer 2006) and to enjoy sharing meals as an occasion for enhancing family togetherness and communication (Fulkerson, Neumark-Sztainer & Story 2006).

I quite like cooking; it makes me feel more grown up. (Emily, 12 years, Food-allergic)

I think it’s quite fun to cook as well and I like to cook a lot with my gran
so that's quite nice to sort of spend time with her and eat at the same time sort of thing. (Focus group member, Non-food-allergic)

Within the theory of adolescent food choice behaviour, food variety seeking, taste and liking of foods are classified as psychosocial, and hunger as a biological factor, both reflecting individual determinants of food choice behaviour. Enjoyment of food preparation and sharing meals represent social aspects of food and are therefore social environmental influences (Story et al. 2002).

**Body Awareness, Feelings, and Temptation of Foods**

Teenagers believe that healthy eating is important and know that it involves moderation, balance and variety (Croll, Neumark-Sztainer & Story 2001). Still, they display unhealthy eating habits and frequently indulge in ‘junk food’ (Demory-Luce 2005), have poor consumption of fruits, vegetables and diary foods, and tend to skip breakfasts (Videon & Manning 2003). One reason could be that teenagers do no want to be seen as interested in healthy eating by their friends, since it conveys a social and symbolic meaning that conflicts with their values (Stead, McDermott, Mackintosh & Adamson 2011). In this study, almost all teenagers from both groups had substantial knowledge of healthy foods and considered healthy eating to be important for well-being and positive body image. Although some of them were consciously trying to follow a healthy diet, many teenagers stated that they were not overly interested in healthy eating. They felt that a healthy diet would limit the consumption of foods they prefer, which include crisps, chocolate, and fast foods. Getting out of unhealthy eating habits was sometimes perceived as being difficult.

*I: What is your understanding of a healthy diet?*

*R: Um, loads of fruit and veg, like five a day if not more, yeah, try and get more in sort of thing, um, not as much crisps and snacks and chocolate, um, and like a good lunch, um, and dinner every day rather than what I’m doing. I know what I’m doing is bad I just can’t get out of the habit of it, if you know what I mean.* (Sara, 18 years, Non-food-allergic)
Teenagers with food allergies did not show a different attitude towards healthy eating than their non-allergic peers. A few indicated that their food allergies would either automatically lead to a healthier diet or it had made them think about the quality of their diet.

R: . . . Yeah protein as well coz of the nuts, not having the nuts . . .
I: Do you think you don’t get enough protein?
R: No, I get enough protein coz I eat lots of meat, but it would be a bit stupid if I was a vegetarian cause I wouldn’t get any protein than eating baked beans and stuff. (Ryan, 13 years, Food-allergic)

Being slim and feeling comfortable with yourself was seen as the biggest advantage of a healthy diet. Adolescence is generally the time where body-shape and weight dissatisfaction peaks (Hill 2002). Also in this study, many teenagers from both groups said that they were concerned with their body image. This was mainly observed in girls, but also in boys.

I: What do you think is the advantage of eating healthily?
R: Um, well you’ll be more stronger and, um, skinnier, and um, more muscly.
I: So, is that something you want to be?
R: Um, yeah. (Ben, 12 years, Food-allergic)

Foods choices are influenced by emotions. Foods can either be chosen for the purpose of lifting mood or as a result of emotional arousal (Babicz-Zielińska 2006). A number of teenagers from both groups saw a close link between food choices and feelings. They described how they would use certain foods to deal with boredom or to comfort themselves in times of sadness.

If I am feeling sad I would eat . . . I like comfort eat. (Focus group member, Non-food-allergic)
However, not all teenagers thought that their eating habits were influenced by their feelings.

*I: Sometimes what we eat is influenced by our feelings. Can you tell me of any experience you've had when you mood influenced your...?*

*R: Not really. (David, 13 years, non-food-allergic)*

Many times, teenagers referred to availability as a reason for choosing foods. They would eat food that was around or offered; they felt it often tempted them. In teenagers, food availability mainly refers to the food severed at home, at school, or in a wider perspective to the place they live (Story et al. 2002), but also what is provided by other people. Teenagers with food allergies did not see any difficulties in finding safe foods in those offered at parties or age-related events.

*Um I normally would eat what was there [at parties], if I know the person then they'll know that I have a nut allergy but like mostly at birthday parties, it’s normally not stuff that I’d be allergic to, it’s lots like crisps or like biscuits or sweets or things that I’ve had before. (Laura, 15 years, Food-allergic)*

For some teenagers, it felt easier to resist the temptation of foods if they were not around in the first place.

*It’s easy if the food’s not there, coz like at one point me and my mum both went on like a healthy eating and like there was no crisps in the house, no like chocolate brownies or chocolate cookies, or Coco Pops um, it’s easier like if it’s not there, if it’s all there around the house to eat then I find it harder. (Kate, 17 years, Non-food-allergic)*
Having a food allergy and consequently choosing foods that do not pose a health risk was perceived as an important factor affecting eating habits.

*R: Why do I eat the food?*
*I: Yeah.*
*R: Coz I’m allowed to, really, coz I know that I can, so I will, really, if I’m allowed to, yeah.* (Luke, 13 years, Food-allergic)

Some of the teenagers seemed to undervalue their allergy; checking labels, avoiding may contain products and asking for ingredients in restaurants was not done routinely.

...I think the only time I tend to read label is if I’ve eaten it and I think I’m reacting [...] but that’s the only time I would ever read the label for food. (Jack, 17 years, food-allergic)

This theme is mainly embedded within three influences of Story et al. (2002)’s theoretical framework. Body awareness and weight consciousness are behavioural factors, and thus individual influences determining teenage food choice decisions. Similarly, emotions are psychosocial factors and food allergies biological factors that belong to individual influences. Although food availability is mostly associated with physical environmental influences, in the context of this study, they refer to social environmental influences as food is made available either by parents or someone else. And finally, beliefs and perceptions on healthy eating are social norms which are societal influences.

**Parental Control vs. Convenience**

Compared to earlier childhood, parents become less and less responsible for their teenager’s decision making. Teenagers start to gain autonomy and control over their food choice in a search for their own identity (Bassett et al. 2008a, Warren et al. 2008, Fitzgerald et al. 2010). Most teenagers from both groups thought that their parents ultimately had a lot of control over their food choices. They described how their parents would decide what they had for
dinner and had the responsibility for the food shopping, and thus, for the food that was available in the house. Parents themselves tend to stock food in the house they wish their children to eat, thereby granting autonomy while ensuring they eat healthy foods (Bassett et al. 2008a). In general, non-food allergic teenagers expressed the wish to have more input into their meals and to take over the responsibility for their food choices from their parents as they grow older:

*I: Do you think people you are eating with influence you?

*R: I think I’m, I think they do because it’s um, the dinner I have most nights, it’s all, you know, it’s what my parents have given me and it’s all kind of stemmed from that. I mean recently I’ve, you know, I’ve wanted to try different, um Chinese meals that I’ve had, you know, a lot of input in, but usually it’s my parents who have decided. (Tom, 15 years, Non-food-allergic)*

In contrast, the majority of food allergic teenagers felt safe under their parents’ control over their food choices, and would not necessarily seek independence from it. The prospect of leaving home some day was accompanied with some degree of uneasiness:

*It’s [allergy] not really a problem, it will be when I go off to University and I’ve got to do things for myself, be a bit of a wakeup call but um, mum’s on the end of the phone so I’ll be alright [laughs]. (Sophie, 18 years, Food-allergic)*

Although many teenagers from both groups mentioned that they had become interested in food shopping or cooking, they also enjoyed the convenience of being served a warm meal at the end of the day. In fact, many teenagers state convenience of food as a major determinant of their food choices (Story et al. 2002, Fitzgerald et al. 2010).

*…it’s probably easier if someone [laughs], if like mum’s cooking or something it’s, it’s kind of, you don’t have to bother with it. (David, 13 years, Non-food-
Trends show an increase in out-of-home eating occasions (Cheng et al. 2007), and teenagers also spend a lot of time eating out, particularly with their peers at weekends (Fitzgerald et al. 2010). Nearly all non-food-allergic teenagers liked the idea of eating out, as they felt it gave them the opportunity to choose foods they wanted.

*My* step-mum’s *like* that, *where* everything in the house, *there’s* no snacks *yeah*, *the* meals always have like, you know, *meat, veg* it’s all healthy stuff like, proper nutrition, *she* always goes on about the nutritional value of a meal is good enough, *which* is why *there’s* things outside the house I eat anything that’s either full of sugar or covered in fat. (Focus group member, Non-food-allergic)

For some food-allergic teenagers, this situation was generally described in the reverse. While the home environment would provide the security of being surrounded by only safe foods, eating out, especially when abroad, demanded higher levels of care.

*Um, I’m* much more nervous about eating out when I’m on holiday because *like* it’s a different language and I don’t really know how to, and I don’t know how to ask, um, **whether** something has nuts in it, so normally I’d just kind of eat stuff that seems like very safe... (Laura, 15 years, Food-allergic)

Parental control is restricted to the home environment, but given that teenagers spend a substantial amount of time away from home, their eating habits are also influenced by their physical environment in the community. Additionally, convenience is considered a perceived barrier to food choice behaviour, which is an individual lifestyle factor. Thus, this theme finds a place in the individual, social environmental and physical environmental influences of Story et al. (2002)'s theoretical framework.
Eating as Social Experience

Family meals are important not only because of the foods parents make available but also for social interaction (Neumark-Sztainer, Story, Ackard, Moe & Perry 2000). Many non-food-allergic teenagers said that they enjoyed sharing meals with friends and family, and considered it to be a nice way of getting together. They felt that eating with other people gave them the opportunity to learn new foods. Nevertheless, such occasions could also turn out to be distressing if someone pestered them to try certain foods. In fact, a ‘social inhibition’ effect can appear when teenagers eat in groups (Péneau, Mekhmoukh, Chapelot, Dalix, Airinei, Hercberg & Bellisle 2009).

…at my auntie’s house I always used to have different things, like we had a big family meal around the table and in that situation I felt like kind of pressured to try new things, so I was trying like vegetables and stuff that I hadn’t had before and yeah, I didn’t really like that, I didn’t like being pressured into that situation. (Sara, 18 years, non-food-allergic)

The majority of food-allergic teenagers stated that they enjoyed shared meals if they felt comfortable with the people they were with. They described how friends and family would often show an appreciable understanding for their food allergies. With less familiar people, they feared the embarrassment of having a reaction in front of them.

…my friends actually they’re really good like if we are eating out, if there’s something that I can’t eat then they won’t eat it either so they are all pretty nice about it. (Laura, 15 years, Food-allergic)

Peers provide teenagers with social support and the norms and attitudes towards food impact food preferences and patterns (Dennison & Shepherd 1995, Contento et al. 2006). In terms of actual food choices, a number of teenagers from both groups tended to have fast food when eating with friends, which was seen as a quick, cheap and convenient way of eating.
(Hill 2002) argues that ‘junk foods’ are not only chosen because of their taste but also as a consequence of them being prohibited by parents. The desire to be like everyone else motivated many teenagers to make similar food choices to their friends. Some food-allergic teenagers would struggle in situations where this was not possible.

Um if I go to a restaurant and there’s a particular dessert that I’ve seen all my friends having and that I can’t usually have, and then they might say that I can, I might just get it because it makes me feel like I’m just like everyone else I can have this. (Emily, 12 years, Food-allergic)

In addition, they were often dependent on other people providing them with safe foods. This would sometimes lead to frustration if they were refused foods they wanted to eat.

Um, well like, when you’re out if, well the problem is sometimes asking people coz they get like worried that you’re gonna be allergic to their food, like when you ask for something from a store or something, they’ll get worried and say to you that you can’t eat from the store anyway, it’s just best when you don’t eat there, then, so you can’t, sometimes it’s hard to ask them if something’s got nuts in coz then they’ll send you away, coz they don’t want you to eat it in case it has. (Ryan, 13 years, Food-allergic)

In general, they would trust that the food they were given was safe for them to eat, even though they reported to having had allergic reactions due to misinformation in the past.

The social environment has a strong influence on teenage food choice behaviour. Social environmental influences within the theoretical framework (Story et al. 2002) refer to interpersonal relationships within the family, with friends, neighbours and acquaintances. They can affect food choice behaviour through modelling, reinforcement, social support and perceived norms.
Routine, Traditions and Environment

Some influences on teenagers’ eating habits did not seem to be affected by food allergies. These included daily routine, family and cultural traditions, and environmental influences. In the view of Marshall (2006), most eating habits follow a certain routine, which would often occur unconsciously and not be obvious to the individual. Many teenagers from both groups mentioned that their eating habits were part of a routine.

Well um, the breakfast I have every day [cereal brand] I’ve had since I was like 4 or 5, um it’s just been the cereal given, I’m happy eating that and I’m settled.  
(Tom, 15 years, Non-food-allergic)

This routine tended to be reversed at weekends and during holidays. In terms of family and cultural traditions, teenagers often thought that these would not impact their food choices, but then there were some traditions that most teenagers were aware of:

…and on Sunday we always have a roast dinner… (Ben, 12 years, Food-allergic)

Even though not overtly important to teenagers, culture has a strong influence not only with respect to cuisine and food but also what constitutes an appropriate meal, the order of serving, table manners, the social organisation of a meal, food and ritual, the meaning of food in life and social intercourse (Rozin 2006). Although climate is considered an environmental determinant of food choices as it affects availability and accessibility of foods (Mela 1999), it can also have an emotional impact on food choices. A few teenagers noted that weather or season would influence their eating behaviour:

I think the weather makes a difference coz if it’s summer I can deal with the fruit and the salads, but in the winter it’s cold, I just feel like eating warm… (Focus
This theme spans across three influences on teenage food choice behaviour as proposed by the theoretical model by (Story et al. 2002). Routine belongs to the individual influences and is a behavioural factor reflecting individual eating or meal patterns that have been established. Cultural factors such as family meal traditions are subject to societal influences on food choices. And finally, climate is a physical environmental determinant of teenage eating behaviour.

**Knowledge Shapes Understanding of Foods**

Vegetarianism is rather common among teenagers and affects more girls than boys. Among the reasons teenagers choose to adopt vegetarian diets are health, animal welfare and environmental aspects (Worsley & Skrzypiec 1998). Also in this study, some non-food-allergic but no food-allergic teenager had chosen to become a vegetarian, mainly because of ethical issues arising from food.

P: I'm a vegetarian, so I don't eat meat or fish.
I: Why?
P: Um, it's just sort of the idea of eating another living thing, sort of thing, um... (Olivia, 13 years, non-food-allergic)

Since many teenage eating occasions take place outside home, they end up spending money at the school cafeteria, restaurants, vending machines and other locations (Story et al. 2002). Thus, price is an issue for teenagers and often a decisive consideration in what to buy (Shannon, Story, Fulkerson & French 2002). In this study, price was equally important to both groups. The majority of teenagers had the opinion that food needed to be good value for money and this was of particular concern when they had to pay for it themselves.

R1: It's not normally as big, like posh restaurants, you don't get like a lot. I don't like little portions though.
R2: I’d prefer bigger.
R3: You got to get full, don’t you?
R4: Yeah. I want value for money. (Focus group member, Non-food-allergic)

A powerful tool having an influence on teenagers’ eating behaviour is television viewing as it constitutes a platform for conveying nutrition messages and advertisement of food products (Ray & Klesges 1993). Mass media is often believed to be a credible source of health information, leading to misconceptions about food, healthy eating and nutrition (Dorey & McCool 2009). Those non-food-allergic teenagers who showed an interest in healthy eating or food used the TV as their primary source of information about this.

I: And where do you get the information from, about healthy eating?
R: Um off the Supersize vs Super skinny thing, I watch that a lot, coz I know that I’m skinny and I know that I’m underweight so I’m trying to find new ways to combat that and help me like vary my diet sort of thing, so I’ve watched that and I watch like cookery shows and stuff, and seeing how much fruit and veg goes into it, and good things go into it like dishes and stuff. It makes me kind of think that, yeah, maybe a healthier diet is that. (Sara, 18 years, Non-food-allergic)

Watching TV was also reported to influence the subconscious desire for food. This not only affected non-food allergic, but also some food-allergic teenagers.

I: Do you think that adverts on TV or on the streets have an influence on you?
R: No. Maybe, sometimes they might put an image in my head like those are the foods I can’t eat, so those must be the best foods in the world, which is a bit sad, but um, sometimes they like put that image in my head. (Emily, 12 years, Food-allergic)

Television viewing has not only been found to stimulate consumption and purchase of food advertised during commercials (Fiates et al. 2008), but also to affect meal structure
in teenagers (Van den Bulck & Eggermont 2006). Mass media is a societal phenomenon having a strong influence on food choice decisions. Likewise, ethical considerations, which can be one reason for vegetarianism in teenagers, refers to cultural values and consequently societal influences. Costs, in contrast, are classified under individual influences, more specifically lifestyle factors, and are viewed as perceived barriers of food choice behaviour within the theoretical framework (Story et al. 2002).
4.6 Discussion

This qualitative study is unique in providing an in-depth account of young people’s food choices from the viewpoint of food-allergic and non-food-allergic teenagers. By comparing the food choice behaviour between these groups, pivotal characteristics that determine food choice decisions of food-allergic teenagers could be identified. Previous research has mainly focused on quality of life and psychosocial effects of food allergies on children, teenagers and their families. A recent review of these studies (Cummings, Knibb, King & Lucas 2010a) concluded that a diagnosis of food allergies has detrimental effects on daily family life, social events and certain aspects of quality of life such as emotional quality of life, physical functioning and quality of school life. The present study adds new knowledge to existing literature by giving prominence to a topic that will help improve the dietary management of food allergies in teenagers.

This study identified six main themes influencing teenage food choice behaviour: Variety and enjoyment of food as learning process, Body awareness, feelings and temptation of foods, Parental control vs. convenience, Eating as social experience, Routine, tradition and environment, and Knowledge shapes understanding of foods. Similarities and differences in food choice behaviour between teenagers with and without food allergies are presented on the subtheme level.

4.6.1 Review of findings in light of existing literature in food allergy research

One of the major findings to emerge from this study is that teenagers with food allergies found it more difficult to be adventurous with new foods than non-food-allergic teenagers. They had a tendency to be cautious about trying new foods, and sticking to familiar foods was often considered to be the safest option. Some food allergic teenagers thought that their allergy prevented them from widening their palate - something that was seen as an important part of growing up. Even though there were also some ‘fussy’ eaters among non-food-allergic teenagers, it was noticeable that food allergies can be a major obstacle to
learning to introduce variety into the diet. This finding corroborates those from a French study showing that food neophobia can be a consequence of food allergies (Rigal, Reiter, Morice, De Boissieu & Dupont 2005). Thus, food allergies might be a formidable barrier to maintaining the varied diet necessary to support adequate growth and health and it is important to promote food-variety seeking in teenagers with food allergies.

Almost all teenagers from both groups described sensory preferences (such as taste and texture) or ‘liking’ as the main driver of their food choices. In addition, physiological consequences such as satiety or energy density were viewed as desirable attributes of foods. Food-allergic teenagers who had been recently diagnosed mentioned that their allergy deprived them of certain foods, especially if they had to give up their favourite foods; a finding echoed in previous research (MacKenzie et al. 2010, Marklund et al. 2007). In most circumstances, food-allergic teenagers have never acquired certain taste preferences and therefore also do not have the feeling of missing out on foods they were not allowed to eat.

Food allergies did not seem to have an effect on overall health awareness of teenagers. Both groups agreed on the importance of a healthy diet for positive body image and well-being, but where taste was concerned, the majority of teenagers preferred snacks and fast foods over healthy foods. Only one food-allergic teenager felt that her allergy had made her automatically eat healthier. Similar thoughts have been expressed by families of food-allergic children (Valentine & Knibb 2011). Since teenagers with food allergies are at an even greater risk of imbalanced diet than those without, health and nutrition education should be integrated into their dietary management. Also emotions and feelings were discussed as influencing factors on food choices, but again no difference was observed between the groups.

Another interesting finding was that none of the food-allergic teenagers believed that finding safe foods at parties was particularly difficult. Previous studies have reported a negative impact of food allergies on the social activities of children and teenagers (DunnGalvin, Gaffney & Hourihane 2009, Flokstra-de Blok et al. 2010, MacKenzie et al. 2010), although
some of them presented the parent’s perspective (Bollinger et al. 2006, Mandell et al. 2005, Ostblom, Egmar, Gardulf, Lilja & Wickman 2008, Valentine & Knibb 2011). It is possible that these limitations are due to the fear or anxiety of a reaction by family, friends or those catering rather than considerations made by the food-allergic teenager in terms of actual food choices. Since social relationships built around food are very important, family and friends should be adequately informed about catering possibilities so that teenagers with food allergies are not prevented from attending social events.

Whereas many food-allergic teenagers conceded that food allergies played a role in their food choices, some of them downplayed its importance, and engaged in risk taking behaviours involving infrequent label reading, consuming ‘may contain’ products, or not asking for ingredients in restaurants; all behaviours that have been described before (Akeson et al. 2007, DunnGalvin et al. 2009, Gowland 2002, MacKenzie et al. 2010, Marklund et al. 2007, Monks et al. 2010, Muñoz-Furlong 2003, Sampson et al. 2006). Here, teaching teenagers food preparation skills and nutritional knowledge of food products in addition to appropriate food allergy avoidance education might help them make better judgements about meals and food products at point of choice.

Adolescence is the period where parental control diminishes and teenagers exercise increased autonomy over their food choices (Bassett et al. 2008a). While non-food-allergic teenagers generally looked forward to taking over the responsibility for their food choices one day, food allergic teenagers appreciated the convenience of having their parents in control as it provided them with security. This is in contrast to other studies where food-allergic teenagers or young adults were struggling with parental hypervigilance (DunnGalvin et al. 2009, Herbert & Dahlquist 2008) or parents themselves expressed concern in regard to overprotection (Gupta, Kim, Barnathan, Amsden, Tummala & Holl 2008). It seems that teenagers with food allergies seek more protection and control for food than their healthy peers, but in others aspects of life, as demonstrated by DunnGalvin et al. (2009) and Herbert & Dahlquist (2008), they have similar parental expectations and demands.
Parental control seemed to be closely linked to the environment within which food choices are made. Non-allergic teenagers often mentioned that if they were outside the home they had the freedom to choose what they wanted. In line with previous investigations (DunnGalvin et al. 2009, MacKenzie et al. 2010, Marklund et al. 2007, Monks et al. 2010), food-allergic teenagers tended to be more careful when consuming foods outside home, especially when travelling abroad. However, these teenagers also highlighted that they still enjoyed eating out. Again, adequate nutritional and food preparation knowledge could be beneficial in these circumstances and reinforces confidence in asking restaurant staff about allergenic ingredients.

Almost all teenagers liked to eat meals in the company of others if they felt comfortable with them. This was primarily true for food-allergic teenagers who did not want attention drawn to their allergy in front of other people. Similar experiences have been reported before (Marklund et al. 2007). Most importantly, teenagers did not want to stand out from their peers so would often consume the same foods as their friends. As shown in other studies (Akeson et al. 2007, Marklund et al. 2007, DunnGalvin et al. 2009), food-allergic teenagers struggle with the feeling of being different, and in situations like this they are reminded of it. Therefore, attempts should be made to prevent eating occasions where teenagers with food allergies are overtly given different food or have to sit at an extra table.

However, there were a range of other factors influencing adolescent food choices that were similar between the groups including eating routine, family and cultural traditions, environmental factors such as the weather. Since these are non-modifiable influences on food choice it appears natural that they have an equal influence on food-allergic and non-food allergic teenagers. The groups showed slight differences in terms of general food-related knowledge or interest such as ethical issues or information on healthy eating conveyed by the mass media. Teenagers without food allergies appeared to be more susceptible to environmental cues about food and eating than those without. However, other issues such as costs or TV advertising were again considered as an influence affecting both groups.
4.6.2 Theoretical considerations

This study highlights similarities and differences in food choice behaviour among food-allergic and non-food-allergic teenagers. It was underpinned by the theoretical model of adolescent food choice behaviour proposed by Story et al. (2002), which rests on social cognitive theory (SCT) and ecological theory. Although all four levels of influence (individual, social environmental, physical environmental and societal) are represented in the results of this study, it is noticeable that individual and social influences played a main role in teenagers’ food choice behaviour. Individual influences, which include psychosocial, biological and lifestyle factors are reflected in six out of seven themes Variety and enjoyment of foods as learning process and Body awareness, feeling, and temptation of foods, and partly in Routine, tradition, and environment (i.e. It’s all about routine, Parental control v.s. convenience (i.e. Why would I bother making food if I don’t have to) and Knowledge shapes understanding of foods (i.e. Food has to be good value for money if I have to pay myself). Likewise, social environment influences, which demonstrate the impact of parents, family, friends and peer networks on teenage food choices, supported the themes Variety and enjoyment of foods as learning process (i.e. I have discovered that the whole experience of foods is enjoyable), Body awareness, feeling, and temptation of foods (i.e. Food is sometimes just around), Parental control v.s. convenience and Eating as social experience. Although also physical environmental and societal influences played a role in the discussion, they appeared to be less obvious to the participants, most likely because these influences are more distant to them and often happen on a subconscious level. However, the fact that in most cases more than one influence fed into a theme indicates the strong interrelation of these influences as suggested by both SCT and ecological theory.

4.6.3 Strengths and limitations

This study is the first one to explore the impact of food allergies on food choice behaviour among teenagers presented from the teenager’s viewpoint. Although there are a number of studies that have addressed psychosocial implications and quality of life issues in children and teenagers with food allergies (Akeson et al. 2007, Lebovidge et al. 2009, Lyons & Forde 2004, Mandell et al. 2005, Flokstra-de Blok et al. 2010, Marklund, Ahlstedt &
Habits are affected. Furthermore, most of the current literature on dietary management of food allergies in children and teenagers is derived from anecdotal evidence (Gowland 2002, Muñoz-Furlong 2003). This study is the first one to address the full complexity of this issue on a research level. The qualitative research design of this study enabled me to investigate this issue and to collect information that extends the findings from previous research (Akeson et al. 2007, MacKenzie et al. 2010, Marklund et al. 2007). Although the findings from qualitative research studies cannot be extrapolated to the target population on a statistical basis, their strengths lie in the depth of understanding of a phenomena studied. It is the content of the range of views, experiences and the factors influencing them that can be transferred to the population. Although some individuals of the population might have different views on which factors are influencing their food choice behaviour, the concepts, categories and explanations provided by this study are likely to remain similar. Qualitative research also reveals areas that can be further looked into in future investigations (Lewis & Ritchie 2003). The change of data collection method from focus groups to interviews has proven to be beneficial in that teenagers of different ages and gender were comfortable sharing their views and experiences in an individual setting. As already highlighted, the group dynamic plays a major role in focus group discussions with teenagers.

Moreover, this study was embedded within a theoretical framework that facilitates determining influences on food choice behaviour that operated not only on a conscious, but also subconscious level. However, future investigations are advised to focus on individual and social environmental influences impacting food choice behaviour among teenagers with food allergies. One of the strengths of this study is also its comparative nature. By comparing non-food-allergic with food-allergic teenagers, similarities and differences in their food choices could be described. This approach enabled the identification of key aspects relevant to teenage food allergy management that would not have been attained by studying teenagers with food allergies by themselves.

Teenagers were recruited through various routes including local schools, a national
support charity (The Anaphylaxis Campaign), and an earlier population-based cohort study on the Isle of Wight (FAIR study) (Pereira et al. 2005, Venter et al. 2006) and, therefore, their characteristics showed a rich variation (Table 4.1). Both groups had similar distributions of gender, parental qualifications, and ethnicity. Teenagers with food allergies were on average slightly younger than those without food allergies, but since qualitative research aims to collect a broad range of views and opinions, it was more important that different age ranges were represented. In addition, teenagers without food allergies were older because of the focus group that was conducted, but this was taken into account during the analysis.

Limitations of this study are also recognised. Although the sample size was large enough to answer the research question of this study, which was to identify themes influencing food choice decisions of teenagers with food allergies, it did not allow me to specify the food choice behaviour of sub-sets of participants such as those defined by age, gender, ethnicity, type and severity of allergy, and time of diagnosis. Also, this study did not include teenagers with non-allergic food hypersensitivity or self-reported food allergies, whose food choice behaviour could be different to those with food allergies. The need to integrate a gender dimension into food allergy research has recently been highlighted as an important area for future study (DunnGalvin et al. 2006).

### 4.7 Conclusion

This research has identified key aspects of food choice behaviour teenagers with food allergies relevant to their dietary management. It emphasizes the importance of promoting food-variety seeking among food-allergic teenagers from an early age since food allergies might be a formidable barrier to trying new foods leading to neophobia in the some circumstances. Although eating out always involves an extra risk of a reaction, food-allergic teenagers should still be encouraged to go to restaurants and food places so that they can learn how to deal with these situations. Education in nutrition and food preparation skills might help them make better judgements in these situations. In general, teenagers with food allergies strive to live a similar life to their peers and this is also true for the food they share. Thus, eating occasions where teenagers with food allergies are overtly given different meals
to their peers should be prevented. Further research is needed to investigate food choice
behaviour in teenagers with food allergies with respect to age, gender, ethnicity, individual
food allergies, severity of allergies and time of diagnosis. Additionally, teenagers with non-
allergic food hypersensitivity or self-reported food allergies should be studied as their dietary
behaviour could be different to the population presented.
Chapter 5

Impact of food allergy on parent-child interactions - a pilot study

5.1 Overview

This chapter describes a pilot study that uses a novel developmental approach to investigate the impact of food allergies on mother-child interaction during a food-related activity. For this purpose, mother-child dyads were observed while playing a board game involving food shopping and classification. Data was analysed using qualitative rating scales for maternal and child behaviours. The results were compared to mother-child dyads of non-food-allergic children in order to identify behavioural patterns associated with food allergies. An example of a positive relationship between a mother and a child with food allergies is presented. The findings are illuminated by literature on quality of life and psychosocial aspects of mothers and children with food allergies as well as food choice behaviour and general developmental literature.

5.2 Background

5.2.1 Rationale for the study

Children’s diets may be influenced by family, friends, child care, school, media and their own tastes and preferences (Birch & Fisher 1998, Larson & Story 2009, Scaglioni,
Parents play a particularly important role in developing young children’s food habits and food preferences. They influence their children’s eating environments through the foods they make available and accessible, by their own eating behaviour, and by the way they interact with children in the eating context (Koivisto Hursti 1999, Birch & Fisher 1998). This has an impact on the rest of the children’s lives, since food preferences and habits formed in childhood serve as a foundation for future eating patterns (Skinner et al. 2002, Kelder et al. 1994), albeit dietary changes do occur throughout the lifespan (Lake, Rugg-Gunn, Hyland, Wood, Mathers & Adamson 2004).

Mothers have a special role in the food socialisation process of their children, not only due to the powerful mother-child bonding during the nursing period (Rozin 1990) but also because they, even in modern times, hold the main responsibility for food provision and preparation within a family (Slater et al. 2012). Although mothers strongly shape their children’s eating habits from the beginning, the age of three to four is considered a transition in children’s food choice behaviour development as cognitive-motivational processes come into play (Contento & Michela 1999) and their eating starts to be influenced by environmental cues about food intake (Patrick & Nicklas 2005a). Children begin to understand the social and cultural meanings of food and eating, and have acquired food preferences and aversions (Birch 1990). Consequently, food and eating-related situations become a source of arguments between parent and child and can affect their relationship (Paugh & Izquierdo 2009).

Parents use different styles and practices to promote dietary patterns for children’s growth and health (Scaglioni et al. 2011). Food-specific parenting behaviours occur within the context of general parenting styles. Maccoby & Martin (1983) classify parenting styles into four categories - authoritarian, authoritative, permissive, and neglectful - along the dimensions demandingness (control, supervision, maturity demands) and responsiveness (warmth, acceptance, involvement). Unlike specific feeding practices such as restriction over food intake or pressure to eat, these generic parenting styles are considered underlying, stable patterns of behaviour, that reflect parent-child interactions in various situations.
Despite a growing body of research, particularly in the area of parenting styles or practices and children being overweight, it is still widely debated how parenting influences children’s food choice behaviour (Ritchie et al. 2005, Savage et al. 2007, Ventura & Birch 2008, Scaglioni et al. 2008, Powell et al. 2011). However, several studies have demonstrated a positive association between authoritative parenting (high in demandingness and high in responsiveness) and children’s weight (Moens et al. 2007) or food consumption patterns (Kremers et al. 2003, Patrick et al. 2005b). This is in line with the general child development literature, which shows that authoritative parenting styles are most often associated with the highest school achievement levels in youth (Spera 2005).

In children with food allergies, the development of their food habits and preferences takes place in the context of their chronic condition. Since parents, and specifically mothers, have the main responsibility over the dietary management of their child’s food allergies (Mandell et al. 2005), their parenting style and the way they interact with the child during food-related situations could be affected by it. A child’s food allergies add a burden onto parents (Komulainen 2010). Previous research studies consistently report the adverse impact of food allergies on quality of life in families of children with food allergies, particularly in the domains emotional burden (Sicherer, Noone & Muñoz-Furlong 2001, Cohen, Noone, Muñoz-Furlong & Sicherer 2004), family social activities or relationships (Primeau et al. 2000, Sicherer et al. 2001, Cohen et al. 2004, Marklund et al. 2006, Valentine & Knibb 2011), and health concerns (Sicherer et al. 2001, Cohen et al. 2004). Emotional stress (Bollinger et al. 2006) and anxiety (Cummings, Knibb, Erlewyn-Lajeunesse, King, Roberts & Lucas 2010b) are intensified in parents of children with food allergies, and they tend to be even greater in those with younger children (Williams, Parra & Elkin 2009). It has also been suggested that mothers suffer more under emotional issues than fathers (King, Knibb & Hourihane 2009), which leads to a desire to overprotect and shelter their child (Mandell et al. 2005, Gupta et al. 2008). Their constant vigilance has been described as a method of gaining control over their child’s food allergies (Rouf, White & Evans 2012, Gillespie, Woodgate, Chalmers & Watson 2007, Mandell et al. 2005). In addition, high levels of parent anxiety have been shown to be related to high levels of reported use of parent control
behaviours in child-rearing (Ackermann 2008).

Parental coping is critical in the development of a child’s risk perception, anxiety and coping over time (DunnGalvin et al. 2009). Children with food allergies themselves rate their quality of life lower than healthy children, predominately in the domains social and emotional issues (Avery, King, Knight & Hourihane 2003, Primeau et al. 2000, Marklund et al. 2006, Ostblom et al. 2008, Cummings et al. 2010b). Moreover, they report experiencing separation anxiety symptoms (Lebovidge et al. 2009, King et al. 2009), which could be linked to increased parent-related stress (Roy & Roberts 2011). However, most of these studies have been conducted in children eight years and above or rely on parental report. Parents differ in their perceptions from children and tend to underestimate the impact of food allergies on their child (van der Velde, Flokstra-de Blok, Dunngalvin, Hourihane, Duiverman & Dubois 2011). Since developmental differences play a role in the psychosocial adjustment of children with food allergies, and younger children are under closer supervision and control relating to their food allergies than older children (DunnGalvin et al. 2009), it is important to understand the perspectives and actions of both child and parent when investigating the impact of food allergies in a young child. This is in accordance with the gradual shift that developmental research has undergone, from focusing on the parent and child as individuals to considering the parent-child relationship as a bidirectional process (Maccoby 1992).

Developmental literature suggests that a mutually responsive or reciprocal interaction between mother and child impacts positively on the quality of their relationship (Maccoby & Martin 1983, Maccoby 1992). Maccoby’s theory is endorsed by Kochanska (2002), who argues that a child who has successfully established a mutually responsive relationship with the mother comes to trust with her and is more willing to cooperate, embrace her values, and internalise standards of her behaviour, which are important socialisation outcomes. In one of her studies, she has further demonstrated that this compliance is fostered by mutually shared positive affect and predicted by gentle maternal guidance or a non-controlling communication style (Kochanska & Aksan 1995). In general, a combination of positive communication
styles of parenting, e.g. responsiveness, sensitivity, warmth, praise, affection, reasoning, attentiveness has been associated with fewer behavioural conduct and emotional problems in children (Rothbaum & Weisz 1994).

In essence, children with food allergies develop their food choice behaviour under imposed dietary restriction. Their relationship to food might be influenced by increased emotional stress and anxiety, not only from their side, but also from that of their parents. Similar to children without food allergies, their food habits and preferences determine their growth and health in present and later life. Existing literature suggests that authoritative parenting styles promote healthy food consumption patterns in children (Kremers et al. 2003, Patrick et al. 2005b), by providing them with high levels of control and support and fostering behavioural compliance and self-regulation (Maccoby 1992). Within the context of food allergies in early childhood, a child’s compliance with maternal requests and expectations is particularly important in view of the child’s participation in the long-term management of the chronic condition which involves appropriate avoidance of allergenic foods. Until now, no study has investigated parent-child interaction in children with food allergies in a food-related context.

Based on existing literature the following hypotheses can be formulated:

- The parenting style of mothers of children with food allergies could be different to those without food allergies due to the extra burden the chronic condition places onto the mother-child relationship.

- In the context of food, mother-child communication in children with food allergies could be characterised by increased maternal behaviour control as compared to children without food allergies.

- Mothers of children with food allergies who display a positive communication style have children with higher levels of engagement and better socialisation outcomes.

Due to the novelty of studying mother-child interaction within the context of food allergies, there was no foundation upon which a study could have been built in terms of feasibility.
of the hypotheses generated as well as established methods to confirm these. Conducting research with children is more challenging than with adults as research procedures need to accommodate the child’s physical, cognitive and emotional development. Thus, several developmental aspects should be taken into account when choosing an appropriate method for collecting data from children. First, children seem to engage more in activities that are fun and that they feel they are competent with. Second, they often do not feel comfortable communicating with unfamiliar adults, and third, they might have a shorter attention and concentration span than adults (Punch 2002).

5.2.2 Use of observations in developmental research

Observations have a long-standing tradition in developmental research. One of their main advantages over other data collection methods is that they provide a window to record real behaviours or events. Using observations helps to better understand children’s behaviour by getting insight into their expression of feelings and actions. They can either be performed in an experimental or natural setting including home, nurseries or school (Irwin & Bushnell 1980).

Experimental observations are situations that are set up and where the child is asked to carry out a certain task to see what happens (Brain 2000). They are generally used to collect quantitative data. Structured observational activities are more artificial than observing real-life activities and they are less trusted in terms of their generalisability than naturalistic, qualitative observations which are conducted in the ‘real’ world (Irwin & Bushnell 1980). However, they are useful in the context of comparisons as they give the observer better control over the data collection and they increase the probability of certain behaviours occurring (Margolin, Oliver, Gordis, O’Hearn, Medina, Ghosh & Morland 1998).

Observations are increasingly being used to study parent-child interactions over food choices. They appear to be particularly suitable for research on young children, who cannot verbally report on their perceptions of their parents’ behaviours (Snoek 2009). Previous studies have observed parent-interactions during mealtime situations (Klesges, Coates,
Brown, Sturgeon-Tillisch, Moldenhauer-Klesges, Holzer, ... & Vollmer 1983, Moens et al. 2007, Orrell-Valente, Hillb, Brechwald, Dodge, Pettit & Bates 2007, Blissett & Haycraft 2011) and shopping (Pettersson, Olsson & Fjellström 2004, O’Dougherty, Story & Stang 2006). One study recorded mother-child interactions in a structured role-play in which children were assigned to grocery shop in a miniature market with their mothers (Snoek 2009). Since the generated hypotheses of this project were embedded within the context of food choice behaviour research, a similar approach to those applied in these research studies was sought.

5.2.3 Rationale and aims of the pilot study

Initially developed for use to study mother-child communication with diabetic children (Chisholm, Atkinson, Donaldson, Noyes, Payne & Kelnar 2011, Chisholm, Atkinson, Bayrami, Noyes, Payne & Kelnar 2012), a novel method in the form of a collaborative problem-solving play involving food shopping and classification was tested in form of a pilot project to investigate the impact of a child’s food allergies on the relationship between child and parent. Mother-child dyads of children with type 1 diabetes face different dietary challenges than those with food allergies in that their management focuses on carbohydrate and lipid intake with a view to maintaining optimal blood glucose control (Silverstein, Klingensmith, Copeland, Plotnick, Kaufman, Laffel & ... Clark 2005) instead of avoidance of causative foods. Therefore, it was important to test the applicability of this method for use in food allergy research. Piloting this novel method to investigate mother-child interaction in children with food allergies in the context of food also included a comparison group of mother-child dyads of non-food-allergic children. Informed by the hypotheses generated from relevant literature, the following objectives were set:

- To assess maternal communication style and child’s engagement behaviour as a predictor of socialisation outcomes during a food-related activity and compare them between mother-child dyads of food-allergic and non-food-allergic children.

- To explore potential differences in parenting styles between mother-child dyads of food-allergic and non-food-allergic children.
• To investigate whether a child’s food allergies are associated with higher use of maternal control behaviours in the context of food.

5.3 Method

The study design is shown as a flow chart in Figure 5.1 and further delineated in the following sections.

5.3.1 Sample

Behavioural studies tend to apply a ‘best guess’ strategy based on existing literature, the approach used and monetary considerations when choosing their sample size. Consequently, deciding on an adequate sample size is neither trivial nor simple (Taborsky 2010). As this study was intended to be a pilot project using a novel approach in paediatric food allergy research, the sample size was kept small on purpose. The intention was to recruit a sample size large enough to obtain statistically significant relationships between maternal and child behaviours and to identify patterns of parenting styles between the food-allergic and non-food-allergic group. Observational research designs require in-depth analysis that is labour-intensive and time-consuming, and sample sizes of $N = 43$ are not atypical (Wilson, Rack, Shi & Norris 2008). It was concluded that a total of 10 children would be sufficient to meet the objectives of this pilot.

Similar to the studies on food choice behaviour of food-allergic teenagers and adults (Section 4.3.1 and 3.3.1), two population strata were included in the study: food allergic and non-food allergic children. Therefore, the stratified sampling strategy of Patton (2002) was used to purposely select a maximum variation of age, gender, socio-economic status, and for those with food allergies, a range of offending foods within each strata. A sampling grid of these key characteristics was developed to facilitate recruitment. Children were included in the study if they were aged 4-8 years old. Those with food allergies also had to fulfil the following criteria:

• IgE or non-IgE mediated allergy to at least egg, milk, peanuts, tree nuts, sesame, crus-
How does food allergy affect mother-child interaction?

Experimental observation

Stratified purposeful sampling strategy

Mother-child dyads of children with food allergy

Recruited through NHS allergy clinic

5 Observations

Qualitative rating scales of mother and child behaviour

Discussion

Mother-child dyads of children without food allergy

Recruited through advertisement

7 Observations

Figure 5.1: Flowchart of study in children

taceans, fish or wheat.

- Diagnosis needed to be confirmed with a positive Skin Prick Test (SPT)/serum specific IgE results plus a convincing clinical history or a positive food challenge.

In addition, children were excluded if they were suffering from another condition that had a marked impact on their dietary intake (e.g. diabetes). Furthermore, mothers and their
children could not participate if they had language difficulties or a poor understanding of English.

5.3.2 Ethical considerations

Ethical approval for this study was also granted by the Southampton and South West Hampshire NHS Research Ethics Committee (A) in March 2010, together with that of the teenager and adult study (Section 3.3.2 and 4.3.2. Ethical considerations are outlined in the respective sections. Information sheets for children had a Flesch-Kincaid readability level of 4, which means the documents are understood by 7-8 year olds (Appendix 5.1). For younger children, parents were asked to explain the study procedure to their children. Written informed consent was obtained from parent(s)/guardian(s) and written assent from children before the start of data collection (Appendix 5.2). Parent(s)/guardian(s) and children were informed of their right to withdraw at any time during the study. The mother of the child displayed in Figures 5.2 and 5.3 gave written consent for the pictures to be used in publications and presentations. Pseudonyms were used to protect the identity of the participants.

5.3.3 Recruitment

Mother-child pairs of food-allergic children were recruited through The David Hide Asthma and Allergy Research Centre on the Isle of Wight. Their dietician identified potential participants from medical records and contacted the mothers asking if they and their child were interested in taking part in the study. They were sent an information package including invitation letter, information sheet for parents and children, consent form and a screening questionnaire (Appendices 5.1 - 5.5). Mother-child pairs of children without food allergies were recruited through advertisement on the University website (Appendix 5.6). Those mothers who expressed an interest in participating with their child received the study information package. All mothers and children who were willing to take part in the study were asked to return the consent form with contact details and the screening questionnaire in the enclosed stamped self-addressed envelope.

Mothers and their children were recruited over the course of the data collection. Once the
consent form and screening questionnaire were received, they were immediately reviewed. If children were considered eligible to take part, mothers were contacted to arrange a time and place for the game. Children were selected on the basis of their differing age, gender, socio-economic background, and food allergies (if appropriate).

5.3.4 Procedure

Mothers of children were contacted to arrange a suitable time and place to participate. Depending on what was most convenient for them, data collection took place at the participants’ home, at The David Hide Asthma and Allergy Centre, or in a meeting room at the University of Portsmouth. Mothers and children were given a problem-solving task related to food choice behaviour in the form of a board game. Children were asked to select food for their birthday party. The board consisted of two platters - the ‘Shopping Platter’ and the ‘Birthday Platter’ (Figures 5.2 and 5.3).

Both platters had the five main food categories (bread, cereals, rice, pasta; sweets, oils, fats; meat, fish, poultry, beans, nuts; fruit; vegetables; cheese, milk, yoghurts) displayed in bright colours. The shopping platter included laminated cardboard replicas of individual food items (e.g., an apple) that were attached by velcro to their respective categories (e.g., fruit). The game consisted of two parts: first, the child selected food items from the ‘Shopping Platter’ and put them in her/his shopping basket. In the second part, the child placed the items s/he had in her/his shopping basket into the respective food categories on the ‘Birthday Platter’ (e.g., apples go in fruits, birthday cakes in sweets, oils & fats, etc.). The mother was instructed to help the child with this task and both were asked to take
into account the child’s allergic condition (if there was one) when planning the birthday meal. The game was scheduled to last a maximum of 15 minutes, with each part taking around 7 minutes. It was recorded with a video tape recorder that was located on a tripod in front of the table where mother and child were playing the game. Although I stayed inside the room during the activity in case the equipment failed or they needed help with the task, I remained in the background to prevent any possible distortion. At the end of the data collection, mother and child were given a £10 gift voucher to thank them for taking part.

In line with Chisholm et al. (2011), ‘Birthday party’ was used as the food choice behaviour context because it is a peer-related event that is a common part of young children’s social lives and involves the selection of food. Food allergies have been shown to significantly affect social activities in children, including birthday parties (Bollinger et al. 2006). This activity allowed the exploration of diet-related interactions in relation to parental and child engagement in an emotionally potent area where the child’s food allergies had to be coordinated with a peer-related event such as birthday party. It further gave insight into the parenting style the mother used in order to direct or control the child’s behaviour.

5.4 Data Analysis

The videotapes were analysed using two coding systems: qualitative global ratings and frequency coding of specified behavioural events. Global ratings are Likert-type ratings scales that allow for the qualitative measurement of behaviour across the entire observation period (Aspland & Gardner 2003). They utilise subjective estimates of quantity to assess more global characteristics such as maternal warmth, child’s engagement etc. (Margolin et al. 1998). So called event-based measures use exact counts of a given behaviour and is therefore a quantitative research method that prevents observer bias (Aspland & Gardner 2003).

The mothers’ style of interacting was coded with the Maternal Behaviour Rating Scale (MBRS) (Mahoney 2008). This 12-item scale assesses four dimensions of parenting style: Responsiveness (responsivity, sensitivity, effectiveness); Affect (acceptance, enjoyment,
expressiveness, inventiveness, warmth); Achievement Orientation (achievement, praise); and Directiveness (directiveness, pace) (Appendix 5.7). The items were rated on a 5-point Likert-type scale with ratings of 1 reflecting a low incidence of the quality being assessed and ratings of 5 indicating a high incidence. Previous research indicates that the instrument’s scales assess parenting characteristics associated with children’s developmental growth and that it is sensitive to changes in interaction promoted through parent-mediated interventions (Mahoney & Powell 1988, Mahoney, Boyce, Fewell, Spiker & Wheeden 1998).

The MBRS was also used to assess the mother’s parenting style. According to Maccoby & Martin (1983), four parenting styles along the dimensions responsiveness and demandingness can be distinguished. Baumrind (1971) suggested that authoritarian parents often try to shape, control and evaluate their children’s behaviour based on an absolute set of standards. Authoritative parents recognize the rights of both parent and child. They attempt to guide their children’s activities in a rational and oriented manner. Indulgent parents are warm, accepting and tolerant but make few demands for mature behaviours, exercise little authority, and allow children to self-regulate as much as possible. Neglecting parents do not care much of their children’s behaviour and parents are often too preoccupied by their own problems and thus neglect their children. Neglecting parents often neglect their parental responsibilities (Maccoby & Martin 1983).

Four parenting categories were defined by dichotomising the sample on each dimension, with the median as cutoff to categorise into more authoritarian, authoritative, indulgent, and neglecting parent. Authoritative parents were those who scored in the upper half on both responsiveness and directiveness, whereas neglectful parents scored in the lower half on both dimensions. Authoritarian parents scored in the lower half on responsiveness/affect and in the upper half on achievement orientation/directiveness. Indulgent parents scored in the upper half on responsiveness/affect and in the lower half on achievement orientation/directiveness (Figure 5.4).

The children’s interactive behaviour with their mothers was coded using the Child Be-
haviour Rating Scale (Mahoney & Wheeden 1998). This scale measured seven global child engagement items: attention, persistence, involvement, cooperation, initiation: activities, joint attention, and affect (Appendix 5.8). The items were adapted from scales reported previously (Meisels, Plunkett, Roloff, Pasick & Stiefel 1986, Egeland & Sroufe 1981) and reflect many of the behaviours that are thought to be core developmental learning processes. The behaviours measured by this scale differentiate the level of engagement of children with and without disabilities during an interactive play with their mother (Kim & Mahoney 2004).

 Frequencies of verbal and non-verbal maternal behaviour control statements during the food selection process were coded along the dimensions commands, soft directives and requests. These categories were adopted from the observational coding scheme used by Chisholm et al. (2011). Commands are clearly stated instructions expressed in imperative form, which demand the child to desist from, or to perform a specific action, e.g. “No, stop!” or “Take the eggs”. Soft directives are statements that control and propose a specific course of action but the directive is expressed in a more modulated way than statements classified as ‘Commands’, e.g. “Why don’t we get some chips?” or “What about some apples?” Requests refer either to statements or questions which directly and explicitly transfer responsibility or choice for the task to the child, e.g. “What would you like?” or “No, it’s up to you”; or to questions which refer to situations where the mother ascertains which food the child has chosen, e.g. “Is this a milk shake?” or “What have you put in your basket?” The key difference between the three statements is the degree of behaviour

<table>
<thead>
<tr>
<th>High responsiveness/affect</th>
<th>Authoritative</th>
<th>Indulgent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low responsiveness/affect</td>
<td>Authoritarian</td>
<td>Neglectful</td>
</tr>
</tbody>
</table>

Figure 5.4: Four parenting styles, adopted from Maccoby & Martin (1983)
control the mother exerts over the child’s food choice decisions. Commanding statements exclude the child from any decision-making, statements in the soft directive category refer to those where the mother includes children in the process in a directive manner, and request statements include children in the activity by handing over the responsibility for food choice decisions to them.

Videotaped observations were coded by myself and two independent raters who were blinded to the allergic condition of the children. Since there are age and gender differences in the patterning of children’s behaviours (Achenbach & Edelbrock 1979), the raters were asked to take those into account when rating the videos. For the MBRS and CBRS scales, reliability was computed based on interrater agreement for all 12 observations of the study. Interrater agreement was coded according to the formula \((\text{agreements}/\text{agreements} + \text{disagreements}) \times 100\) (Bakeman & Gottman 1997). For the MBRS the average interrater agreement was 68%, with agreement for individual scale items ranging from 38% to 100%. For the CBRS overall interrater agreement was 75%, with agreement for individual scale items ranging from 32% to 95% for individual scale items. Since interrater agreement was generally very low, the three raters sat down together to discuss variations in ratings for all videos. We agreed on final ratings which were then used in the subsequent analysis. For the frequency coding of maternal control behavioural events, inter-rater reliability was assessed across categories for 3 out of 12 videos taken. In every video, agreement exceeded 85%.

Statistical analysis was carried out with IBM SPSS Statistics for Windows (version 20, Armonk, NY: IBM Corp.). Mann-Whitney U test was used to compare scores of maternal and child behaviours between the food-allergic and non-food-allergic group. Since statistically significant differences were only observed for mother pace and mother sensitivity to child’s behaviour, mother-child dyads of food-allergic and non-food-allergic children were combined for the analysis to identify interactional patterns. Spearman rank correlation was used to assess relationships between maternal and child behaviours. However, in order to examine the results further, mother-child dyads were analysed separately by dichotomising each behaviour into categories above and below the median. \(\chi^2\)-square test
was used to determine the association between directiveness and food-allergic/non-food-allergic condition. The results were interpreted and qualitatively discussed with respect to the two different groups. One mother-child pair of the food-allergic group that scored very high on both scales was presented as an example of positive mother-child interaction. For comparison of maternal control behaviour events between mothers of food-allergic children and those without, proportions of events in each category were calculated and Mann-Whitney U test was performed to detect differences between the two groups.

5.5 Results

This study included 12 children, five with food allergies and seven without. Their mean age was 5.6 and 5.9 years, respectively. The gender distribution was similar in both groups, but there were in total more girls than boys included in the study. Mothers and fathers of non-food-allergic participants were higher educated than those of food-allergic children. Another difference between the two groups was observed in terms of ethnicity. In contrast to the non-food-allergic children, which were exclusively White, the food-allergic group had 3 children from other ethnic backgrounds. None of the children in this study followed a vegetarian or vegan diet. Within the group with food allergies, all children apart from one child were suffering from allergies to more than one food. The foods causing reactions ranged from peanuts and tree nuts to milk, eggs and wheat. The characteristics of each individual child are displayed in Table 5.1.

Mothers and children of the food-allergic and the non-food-allergic group did not show major differences in their behaviour (Table 5.2). Maternal behaviours including pace (p = 0.023) and sensitivity to child’s interest (p = 0.005) were found to be statistically significantly higher among mothers of the food-allergic group, both characteristics that do not provide sufficient information about the quality of the relationship alone. Thus, mother-child dyads were combined for further analysis.

The analysis of all 12 mother-child pairs showed that several maternal behaviours of responsiveness and affect were correlated with child behaviours such as cooperation, joint
attention and affect (Table 5.3). Specifically, mothers who clearly enjoyed interacting with the child communicated and reacted emotionally towards the child, and expressed warmth at the same time, had children who were more willing to cooperate or comply with their requests or suggestions, initiated interactions and engaged with them, and showed an overtly positive affect towards the mother or the activity in general. A similar result was obtained for praise, which was categorised under achievement orientation on the scale.

Maternal behaviours such as sensitivity to the child’s activity or play interest as well as responsivity to the child’s actions, requests and intentions were not associated with the child’s behaviours despite responsivity and child’s affect towards the mothers. However, even though the results were not statistically significant, correlations between sensitivity or responsivity and child’s attention to the activity, involvement in the activity, and cooperation with the mother were moderately high. By far the strongest effect was observed for maternal effectiveness, which refers to the parent’s ability to engage the child in the play interaction. Mothers who scored high in effectiveness were more likely to have children showing high attention to the activity, being highly involved in the play, cooperative, initiating activities with their mother and demonstrating high affection towards them.

Maternal acceptance or affirmation for the child and what the child was doing was significantly correlated with the child’s behaviours, joint attention and affect. Likewise, children were more willing to cooperate and to show affect if mothers were very inventive in the way they stimulated the child during the play. In contrast, maternal encouragement of cognitive achievement, directiveness and pace as in the mother’s rate of behaviour were not related with any child’s behaviours. Although none of the correlations were statistically significant, the results indicated that directiveness is rather negatively associated with a child’s behaviour. This means that mothers who demonstrated more directiveness towards the child, had children who were less engaged in the activity.
Table 5.1: Characteristics of children

<table>
<thead>
<tr>
<th>Allergy</th>
<th>Age</th>
<th>Gender</th>
<th>Education mother</th>
<th>Education father</th>
<th>Ethnicity</th>
<th>Type of diet</th>
<th>Avoidance</th>
<th>Culprit foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shan</td>
<td>Yes</td>
<td>6</td>
<td>Male</td>
<td>GCSE/A-level</td>
<td>Degree level</td>
<td>Chinese</td>
<td>Omni</td>
<td>Multiple foods</td>
</tr>
<tr>
<td>Zac</td>
<td>Yes</td>
<td>5</td>
<td>Male</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
<td>White British</td>
<td>Omni</td>
<td>Multiple foods</td>
</tr>
<tr>
<td>Claire</td>
<td>Yes</td>
<td>4</td>
<td>Female</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
<td>White British</td>
<td>Omni</td>
<td>Multiple foods</td>
</tr>
<tr>
<td>Kim</td>
<td>Yes</td>
<td>5</td>
<td>Female</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
<td>Mixed</td>
<td>Omni</td>
<td>Single foods</td>
</tr>
<tr>
<td>Marisha</td>
<td>Yes</td>
<td>8</td>
<td>Female</td>
<td>GCSE/A-level</td>
<td>Black British</td>
<td>Omni</td>
<td>Omni</td>
<td>Multiple foods</td>
</tr>
<tr>
<td>Emma</td>
<td>No</td>
<td>7</td>
<td>Female</td>
<td>Postgraduate</td>
<td>Postgraduate</td>
<td>White British</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>Justin</td>
<td>No</td>
<td>7</td>
<td>Male</td>
<td>Degree level</td>
<td>Degree level</td>
<td>White British</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>Lily</td>
<td>No</td>
<td>5</td>
<td>Female</td>
<td>Postgraduate</td>
<td>Postgraduate</td>
<td>White Other</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>Liam</td>
<td>No</td>
<td>7</td>
<td>Male</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
<td>White British</td>
<td>Omni</td>
<td></td>
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<tr>
<td>Grace</td>
<td>No</td>
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<td>Female</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
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<td>Omni</td>
<td></td>
</tr>
<tr>
<td>Maya</td>
<td>No</td>
<td>5</td>
<td>Female</td>
<td>Postgraduate</td>
<td>Degree level</td>
<td>White Other</td>
<td>Omni</td>
<td></td>
</tr>
<tr>
<td>Molly</td>
<td>No</td>
<td>5</td>
<td>Female</td>
<td>GCSE/A-level</td>
<td>GCSE/A-level</td>
<td>White British</td>
<td>Omni</td>
<td></td>
</tr>
</tbody>
</table>

*Pseudonyms have been used.
<table>
<thead>
<tr>
<th></th>
<th>Children with food allergies $(N = 5)$</th>
<th>Children without food allergies $(N = 7)$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>4 (2)*</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Responsivity</td>
<td>3 (3)</td>
<td>5 (1)</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>4 (3)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Acceptance</td>
<td>3 (3)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>3 (1)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Expressiveness</td>
<td>3 (3)</td>
<td>4 (2)</td>
</tr>
<tr>
<td>Inventiveness</td>
<td>3 (2)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Warmth</td>
<td>3 (4)</td>
<td>4 (1)</td>
</tr>
<tr>
<td>Achievement</td>
<td>3 (1)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Praise</td>
<td>2 (3)</td>
<td>3 (2)</td>
</tr>
<tr>
<td>Directiveness</td>
<td>4 (2)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Pace</td>
<td>4 (1)*</td>
<td>3 (0)</td>
</tr>
<tr>
<td><strong>Child</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention</td>
<td>4 (1)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>Persistence</td>
<td>4 (1)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Involvement</td>
<td>4 (2)</td>
<td>5 (3)</td>
</tr>
<tr>
<td>Cooperation</td>
<td>4 (3)</td>
<td>5 (4)</td>
</tr>
<tr>
<td>Initiation</td>
<td>5 (2)</td>
<td>4 (3)</td>
</tr>
<tr>
<td>Joint attention</td>
<td>3 (3)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Affect</td>
<td>3 (2)</td>
<td>4 (3)</td>
</tr>
</tbody>
</table>

*p < 0.05 Mann Whitney U test
### Table 5.3: Correlations mother-child behaviours

<table>
<thead>
<tr>
<th>Mother</th>
<th>Attention</th>
<th>Persistence</th>
<th>Involvement</th>
<th>Cooperation</th>
<th>Initiation</th>
<th>Joint attention</th>
<th>Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>0.403</td>
<td>0.004</td>
<td>0.446</td>
<td>0.455</td>
<td>-0.165</td>
<td>0.264</td>
<td>0.376</td>
</tr>
<tr>
<td>Responsivity</td>
<td>0.321</td>
<td>0.128</td>
<td>0.456</td>
<td>0.400</td>
<td>0.064</td>
<td>0.563</td>
<td>0.733*</td>
</tr>
<tr>
<td>Effectiveness</td>
<td>0.716*</td>
<td>0.472</td>
<td>0.698*</td>
<td>0.776*</td>
<td>0.404</td>
<td>0.875*</td>
<td>0.931*</td>
</tr>
<tr>
<td>Acceptance</td>
<td>0.391</td>
<td>0.164</td>
<td>0.469</td>
<td>0.407</td>
<td>0.234</td>
<td>0.582*</td>
<td>0.713*</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>0.562</td>
<td>0.287</td>
<td>0.550</td>
<td>0.637*</td>
<td>0.377</td>
<td>0.724*</td>
<td>0.870*</td>
</tr>
<tr>
<td>Expressiveness</td>
<td>0.197</td>
<td>0.118</td>
<td>0.230</td>
<td>0.663*</td>
<td>-0.057</td>
<td>0.836*</td>
<td>0.798*</td>
</tr>
<tr>
<td>Inventiveness</td>
<td>0.451</td>
<td>0.050</td>
<td>0.537</td>
<td>0.600*</td>
<td>0.104</td>
<td>0.529</td>
<td>0.622*</td>
</tr>
<tr>
<td>Warmth</td>
<td>0.251</td>
<td>0.084</td>
<td>0.333</td>
<td>0.813*</td>
<td>-0.208</td>
<td>0.712*</td>
<td>0.702*</td>
</tr>
<tr>
<td>Achievement</td>
<td>0.079</td>
<td>-0.180</td>
<td>0.049</td>
<td>0.416</td>
<td>-0.134</td>
<td>0.250</td>
<td>0.260</td>
</tr>
<tr>
<td>Praise</td>
<td>0.296</td>
<td>0.138</td>
<td>0.323</td>
<td>0.596*</td>
<td>0.071</td>
<td>0.800*</td>
<td>0.815*</td>
</tr>
<tr>
<td>Directiveness</td>
<td>-0.115</td>
<td>-0.532</td>
<td>-0.181</td>
<td>-0.079</td>
<td>-0.264</td>
<td>0.032</td>
<td>-0.207</td>
</tr>
<tr>
<td>Pace</td>
<td>-0.157</td>
<td>0.030</td>
<td>-0.029</td>
<td>0.157</td>
<td>-0.175</td>
<td>0.173</td>
<td>0.029</td>
</tr>
</tbody>
</table>

*p < 0.05 Spearman rank correlations

N = 12, all mother-child dyads combined
Table 5.4: Maternal directiveness by groups

<table>
<thead>
<tr>
<th></th>
<th>Children with food allergies (N = 5)</th>
<th>Children without food allergies (N = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High directiveness</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Low directiveness</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>% High</td>
<td>80%</td>
<td>57%</td>
</tr>
</tbody>
</table>

χ-square test, P-value = 0.58
High and low directiveness corresponds to scores above and below the median.

Table 5.5: Maternal behaviour control by groups

<table>
<thead>
<tr>
<th></th>
<th>Children with food allergies (N = 5)</th>
<th>Children without food allergies (N = 7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>commands</td>
<td>0.18 (0.12)</td>
<td>0.07 (0.08)</td>
</tr>
<tr>
<td>soft directives</td>
<td>0.25 (0.18)</td>
<td>0.08 (0.09)</td>
</tr>
<tr>
<td>requests</td>
<td>0.57 (0.24)</td>
<td>0.85 (0.15)</td>
</tr>
</tbody>
</table>

Mann-Whitney U test

Table 5.4 displays the distribution of maternal directiveness between mother-child pairs with and without food-allergic children. Although not statistically significant (p = 0.58), mothers of children with food allergies tended to direct the child’s immediate behaviour more frequently and intensively than mothers of children without food allergies (80% vs. 57%). These results could be confirmed by direct counts of maternal control behaviours in the first part of the game (Table 5.5). Mothers of children with food allergies showed a higher use of commands and soft directives than those without while being less likely to hand over the complete responsibility over food choice to their child. This time, results were statistically significant or close to significant.
In terms of parenting style, no specific pattern for either of the groups emerged (Table 5.6). Within the group with food allergies as in the group without food allergies, mothers tended to employ a range of parenting styles in their child-rearing. The majority of mothers used an authoritative parenting style during the activity (N = 5), followed by an authoritarian style (N = 4). Even though not consistent, it seemed that authoritative parenting was most effective in fostering child engagement, since four out of five children whose mother displayed an authoritative parenting style showed high scores with respect to their engagement behaviour during the activity. There was one child that scored high on all child behaviour scales with a mother using an indulgent style, and another with a mother using an authoritarian parenting style.
Table 5.6: Parenting style and child’s engagement

<table>
<thead>
<tr>
<th>Parenting style</th>
<th>Attention</th>
<th>Persistence</th>
<th>Involvement</th>
<th>Compliance</th>
<th>Initiation</th>
<th>Joint attention</th>
<th>Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shan</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Claire</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Maya</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Molly</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Zac</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Justin</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Liam</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Grace</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Lily</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Emma</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Kim</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Marisha</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
</tbody>
</table>

*+/*− indicate scores above and below median on 5-point Likert-scale*
Case study

Zac and his mother represented an example of positive mother-child interaction during the collaborative-problem solving activity according to their scoring on both scales, which reflected the impression given from the video. At the time of the study, Zac was five years old and allergic to milk and eggs. With the MBRS, an authoritative parenting style of the mother was identified. In general, their relationship was characterised by mutual respect and affect. Throughout the activity, they demonstrated a high degree of interdependent and active collaborative problem-solving behaviours and communication, indicating a solid partnership between the two.

The mother tended to be very sensitive to the child’s play interests and monitored every step of the activity. She represented a supportive presence and was responsive to the child’s requests and actions at any time. She helped Zac whenever he needed it.

Z: What is that? [child points at food item]
M: Sausages.
Z: Oh I like sausages. [child picks food]

Zac seemed to be somewhat shy and reserved at the beginning of the game, and he obviously required some assistance with the task, which his mother offered. She suggested several foods they could choose from the shop for this birthday party in a directive, but not in a controlling manner.

M: Did you reckon that lovely cucumber? [mother reaches out for cucumber]
Z: Yes, let’s get them! [child picks the cucumber]

Zac quickly overcame his initial reservation and gained more confidence in his actions over the course of the game. He started to overtly enjoy it. It appears that his experience of the
session resulted in feelings of success and competence.

Z: That’s it. [child picks food item]

M: Is that it? What is that? [mother leans over to child]

Z: That’s pasta, I know where the pasta goes, just do it dododododo... [child is singing and places food onto platter]

Zac’s mother also seemed to enjoy the interaction with her child. She laughed with him on a number of occasions.

M: Yeah, is that marshmallows? [mother points at food]

Z: Yes, let’s have marshmallows, and a lollipop, and sweets! [child picks all of them]

M: Ok, right. [mother laughs]

Z: That’s all we do.

This example also demonstrates the observed reciprocal affect in their relationship. They sat close together and shared bouts of laughter whilst looking into each others eyes. The mother seemed to be very pleased and delighted about Zac himself and his performance during the activity. She conveyed warmth and fondness for him through verbal endearments, gestures and the tone of her voice. She often spoke in an animated, but natural way.

M: That’s cause you like your fruit.

Z: Yeah I have all days, that is all you need, I love my frutie! [child places food items into fruit category on birthday platter]

Likewise, Zac initiated interactions with his mother. He got more and more excited and engaged towards the end of the session and with his excitement the frequency of moments
of affect and communication with the mother increased.

Z: That is my favourite! [child picks food item and shows it to mum, smiles]

Throughout the game, the mother showed respect and acceptance for Zac’s decisions, even though their opinions sometimes diverged.

M: Right you gonna put these on your board then?

Z: No, I want more… [mother accepts child’s decision and lets him choose more foods]

In other situations, they negotiated over food choice decisions.

M: But this is for your birthday.

Z: There was, on my birthday, that was…

M: You didn’t have broccoli for your birthday, did we?

Z: But we could have this for my other birthday. [child puts broccoli into basket]

M: Do you want to have some broccoli for your other birthday? Ok.

To the same extent that the mother let Zac decide which food he wanted to buy for his birthday party, Zac also complied with his mother’s suggestions of foods, which as shown below he considered carefully. This thoroughness also indicates a high level of involvement in the game from his side.

M: There are some tomatoes for your party, didn’t we? [mother points at tomatoes]

Z: Tomatoes? [child thinks whether he should take tomatoes]
M: Some little ones, didn’t we, right, yeah? [he takes his time, but finally picks tomatoes]

Over the course of the session, the mother was very effective in keeping Zac engaged in the play interaction. In moments when Zac got somewhat distracted or looked around, which did not occur very frequently, she quickly managed to draw his attention back to the game.

[child reaches out to place food onto platter, chair slides back and child almost falls off, items fall from shelf behind, mother reacts and grabs his arm]
M: Never mind.
Z: That is some thingy. [child resumes playing]

In terms of cognitive achievement, the mother sought to stimulate Zac’s development without putting much pressure on him. However, even though the stimulation she provided was matched to Zac’s age, she never sought to enhance the child’s understanding or knowledge of foods to a higher level.

Z: Oh I don’t know where tuna goes?
M: Tuna is a fish.
Z: I think it goes on that one. [points at correct category]
M: That’s right.

Whenever Zac did well in categorising the foods into the right food group, the mother verbally praised him for doing well on his achievement or expressed her approval by changing her voice or smiling.

[child places orange into right category] M: That’s it, well done!
In contrast to other children, Zac showed interest in the activity and remained engaged with it throughout the entire play. As demonstrated by the example below, he was keen on completing the task.

Z: We got yoghurt on that one, we need to finish this one! [child points at fruit category on birthday platter]

With respect to Zac’s food allergies, a few aspects were noticeable. First, his mother hardly mentioned his food allergies or his restricted choice during the activity. Second, Zac appeared to know very well what he was allowed to have and what he could not eat. He tended to select foods from food groups that he knew were safe for him to eat, e.g. fruit and vegetables. And third, he reacted with rejection and disgust whenever he spotted a food that he could not have.

Z: Ahh I don’t want that… [child puts cheese back onto platter]

Z: Oh I hate eggs, the yelled eggs! [he spots eggs on the platter]

Other than these observations, Zac’s food allergies were not present during the activity. He did not seem to get frustrated by the limited choice of foods he had, rather the opposite, he appeared to appreciate all the foods he could have. In this study, food allergies did not affect the mother-child relationship in a food-related context.

5.6 Discussion

5.6.1 Review of findings in light of existing literature in food allergy, food choice behaviour and developmental research

This pilot study has reported data regarding a novel approach to studying the impact of food allergies on mother-child interaction in young children. Compared to same-age
children without food allergies and their mothers, mother-child dyads of children with food allergies did not show major differences both in the level of children’s engagement, important socialisation outcomes, and mothers’ style of interacting or parenting; they rather indicate great variability at the individual level. However, the results also do not rule out the possibility that mothers of children with food allergies use more control behaviours when communicating with their children than those of non-food-allergic children. As shown by the case study, a child with food allergies is able to establish a positive relationship with food if the mother employs a mix of responsiveness, warmth and demandingness, but not in a controlling manner. Even though the findings from this study are difficult to extrapolate to the mother-child dyads of the food-allergic population and consequently do not have implications for practice as yet, they point out several interesting aspects of the psychosocial implications of food allergies in young children that warrant further investigations. In addition, a novel approach studying this issue has been presented.

In a combined analysis of all mother-child dyads, correlational analyses showed that maternal behaviours of responsiveness and affect are associated with child engagement behaviours such as cooperation, joint attention and affect (Table 5.3). The maternal behaviour that was correlated with the most child behaviours was effectiveness. In contrast, maternal behaviours reflecting achievement orientation and directiveness were not related with any of the child’s behaviours, apart from praise which was significantly correlated with child cooperation, joint attention and affect. Similar results have been reported by a previous study that has used the MBRS and CBRS to assess maternal and child behaviour in mother-child dyads of children with and without mental disabilities (mean age 4.4 years) (Kim & Mahoney 2004). The authors highlighted the potential of a responsive interaction style to enhance children’s opportunities to engage in constructive learning behaviours in each of the interactive episodes they have with their parents. More importantly, these findings are in line with general developmental literature suggesting that children’s cooperation is predicted by mutually shared positive affect and a positive maternal communication style (Kochanska & Aksan 1995). In other words, those mothers who promote children’s participation in decision-making process by demonstrating responsiveness and affect are more likely to have
children who share the affect with them and cooperate their requests and expectations.

However, when examining each mother-child dyad individually, it transpired that those mothers who displayed an authoritative parenting style tended to have children who showed high levels of engagement in the activity (Table 5.6 and case study). This finds confirmation in a recent review of general developmental literature suggesting that children need supportive and responsible parents, structure, and the need to feel they have some degree of control over their own actions in order to be effectively socialised (Grusec 2011). The findings also relate to some evidence in the paediatric food choice behaviour and chronic disease literature. For example, in a study of children from 3 to 5 years of age and their caregivers (Patrick et al. 2005b), authoritative feeding was positively associated with the availability of fruit and vegetables, attempts to get the child to eat dairy, fruit and vegetables, and with reported child consumption of dairy and vegetables. A further study (Davis, Delamater, Shaw, La Greca, Eidson, Perez-Rodriguez & Nemery 2001) reported that an authoritative parenting style was related to better adherence to treatment as well as better glycemic control in a multi-ethnic sample of 4-7 year-old children with type 1 diabetes.

In this study, no salient differences in the parenting styles of mothers in the food-allergic and non-food-allergic group were identified. It was noticeable that parenting styles highly varied within each group, with three out of four possible parenting styles being displayed (Table 5.6). This would indicate that the chronic condition itself, food allergy, does not have an effect on how mothers and children interact. However, at the same time a higher, non-statistically significant degree of directiveness in mothers of children with food allergies was observed (Tables 5.4 and 5.5). A higher degree of control behaviours in mothers of children with food allergies has been reported by Ackermann (2008) who measured parent stress, anxiety, parenting style and child anxiety in mother-child dyads of children with food allergies (6 to 13 years old). She found that high levels of stress place mothers of food-allergic children at risk to experience anxiety, and that high levels of parent anxiety are associated with high levels of reported use of parent control behaviours and child anxiety. However, parenting style did not act as a mediator between parent anxiety
and child anxiety symptoms. Further investigations are therefore required into which way child food allergies affect parenting styles in mothers in a food-related context and whether parental anxiety and stress play a mediating role.

Belsky (1984) argues that parental functioning is determined by personal psychological resources of parents, characteristics of the child, and contextual sources of stress and support. Individual differences in parental functioning of mothers of children with food allergies therefore need to be viewed in the light of personal circumstances of the mother, her character, the support she receives in her immediate environment, and the temperament of the child. This is supported by Williams et al. (2009) who have demonstrated in their study on caregivers of 282 food-allergic children (mean age 8.01 years) that parental indices of adjustment including guilt and worry, uncertainty, sorrow and emotional resources are associated with child age and behavioural problems but unrelated to child allergy characteristics.

It is well established that children who suffer from chronic disease are at increased risk for behavioural disturbances, particularly those with severe and life-threatening conditions and within their first year after diagnosis (LeBlanc, Goldsmith & Patel 2003). Although some level of distress and anxiety may be protective if it leads to better management and reduced risk taking behaviour (Avery et al. 2003, Mandell, Curtis, Gold & Hardie 2002), high levels of psychological distress are maladaptive and can cause depression, anxiety, stress and social isolation (Ravid, Annunziato, Ambrose, Chuang, Mullankey, Sicherer, Shemesh & Cox 2012). Anxiety seems to peak between the ages of 6-11 when children start to understand the seriousness of their allergy, but their level of ability for self-protection is still inadequate (Mandell et al. 2005). Behavioural problems in children with food allergies may not only manifest as psychosocial disorders such as separation anxiety (Lebovidge et al. 2009, King et al. 2009) but also as anxiety related to food and eating (Avery et al. 2003).

Although food choice behavioural problems have not been documented in older children or adults with food allergies, food refusal has been shown to occur in toddlers with food
allergies (Fortunato & Scheimann 2008) and more specifically eosinophilic gastrointestinal disease (Mukkada, Haas, Maune, Capocelli, Henry, Gilman, ... & Atkins 2010). Additionally, a study on children aged 5-14 years in France showed that children who have outgrown their food allergies are more reluctant to try new foods than their siblings (Rigal et al. 2005). Food neophobia and refusal could result from unnecessarily high dietary restrictions that parents place on their children due to increased anxiety and fear of a reaction (Ng et al. 2011). The child in the present case study reacted to allergenic foods with rejection and disgust, and tended to select foods from food groups that were safe for him to eat. However, he also appeared to appreciate all other foods he could have and did not display signs of behavioural disturbances in relation to food. This example demonstrates that mother and child can establish a positive and good working relationship in the context of food despite the child’s food allergies. It also shows the importance of being mindful of the child’s behaviour when studying the effect of food allergies on their relationship.

5.6.2 Study population

This pilot study aimed to recruit a study population showing a wide variation of sociodemographic and food allergy characteristics. Although this aim was partly achieved, mother-child dyads between the food-allergic and the control group differed in some key characteristics. First, mothers and fathers of children without food allergies held higher qualifications than parents of children with food allergies. And second, these children were exclusively White, whereas children of the food-allergic group had various ethnic backgrounds. Darling & Steinberg (1993) have already highlighted that parenting style is best understood in the context within which socialisation occurs. The influence of ethnicity and socio-economic status on parenting style has also been reported in food choice behaviour literature. In a study on 231 caregivers of children aged 3-5 years old, Hughes et al. (2005) found that Hispanic parents were more likely to be indulgent by contrast to Afro-American parents who tended to be more uninvolved with respect to their feeding styles. Cardel et al. (2012) reported slightly different results. In their study, Hispanic American parents placed significantly higher levels of restriction and put more pressure to eat on their children than Afro-American and European-American parents. Also socio-economic status was inversely
associated with parental restriction and pressure to eat. It is therefore possible that both ethnicity and socio-economic status had an influence on the results obtained in the present study.

Although children from the food-allergic and control group did not differ in their mean age, the numbers are rather crude as age was only assessed in years and not in months. This inaccuracy could matter in terms of the child’s cognitive development, which in turn might have an influence on the mother’s involvement in the activity. Despite efforts to take child’s age and gender into consideration when rating maternal and child behaviour, it cannot be ruled out that they had an influence on observed differences in behaviours.

Other important characteristics which could impact parenting style or mother-child interaction in a food-related context were not assessed in this study. Fox, Platz & Bentley (1995) identified multiple determinants including maternal age, marital status, education level, number of children living at home and family socio-economic characteristics to influence parenting practices among parents of young children. Maternal controlling behaviours during food choice decisions might also be related to characteristics such as maternal BMI, body dissatisfaction, and child’s weight (Gray, Janicke, Wistedt & Dumont-Driscoll 2010). Within the food-allergic group, food allergy characteristics including perceived severity of food allergies and time of diagnosis could have contributed to the way mother and child communicated during the activity. As reviewed by Klinnert & Robinson (2008), levels of parental anxiety are particularly high at the time of diagnosis when parents learn that an anaphylactic reaction might lead to death. Similarly, severity of reactions could be associated with parental adjustment to the child’s condition. Since all these factors could play an underlying role in mother-child interaction, it is important to assess and control for them in future investigations.

Furthermore, the sample size of a pilot study is naturally small. The results mainly serve as a base for further studies and should therefore be interpreted with this in mind. The estimation of an adequate sample size large enough to detect behavioural differences between mother-child dyads with and without food allergies remains difficult though. A
previous study using MRBS and CRBS to compare two groups included 30 pairs in total (Kim & Mahoney 2004). A recent meta-analysis of 33 observational studies found 56 pairs as an average sample size (Wilson et al. 2008). Given the high variation of behaviours in this study, a sample size of at least 40 mother-child dyads is recommended.

5.6.3 Methodological issues

The effect of food allergies on mother-child interaction in a food-related context was studied using a novel method in food allergy research. The board game required the participation of both mother and child and presented a context for a collaborative activity involving the selection and classification process of foods. The findings suggest that the approach has promise, although they have to be interpreted in the light of a pilot study. Additionally, they are based on comparison and correlational analyses and do not give insight into the mechanisms underlying associations between maternal and child behaviour. For future use of this method, it is important to consider several aspects that were notable during the mother-child activity. Before playing the game, mother and child need to receive clear instruction on how to play the game. Some mothers tended to misunderstand their role in the activity believing that the main focus would be on the child’s behavioural and cognitive skills. This could provide an explanation why a few children cleared the whole shopping plate in the first part of the game. Thus, if the birthday shopping should resemble a real situation, this has to be emphasised at the beginning. Alternatively, the selection of food items could be limited to a set amount. Although not an objective in this study, the board game would have the potential to study collaborative food choice decision-making between mothers and children with food allergies. Similar approaches have been tested by Snoek (2009) who observed mother-child interaction while shopping in a miniature supermarket, and Lynch (2010) who analysed youtube videos of children alone and interacting with parents in toy kitchen settings to study nutritional behavioural development. As this board consisted of two parts, shopping and classification of foods, it could also be used to test nutritional knowledge of children with food allergies. Interestingly, many mothers showed different behaviours in the first part than in the second part of the game, indicating different levels of behaviours depending on the task.
Analysis in this pilot study was performed using qualitative rating scales and direct counts of specified behavioural events. The latter was used to complement and confirm the results of the first one, which is major strength of this study. With global rating scales, although they have crucial advantages over direct counts of behaviours in that they summarise behaviours over the interaction process (Margolin et al. 1998), they are prone to observer bias and ensuring inter-observer reliability is central (Aspland & Gardner 2003). Indeed, the two other raters and I differed widely in some video ratings at the start of the analysis. However, disagreements were resolved by watching and discussing the videos together. For a study with a larger sample size, adequate training of all raters at the beginning of the analysis is needed.

Another issue in experimental observations is the representativeness of parent-child interaction (Gardner 2000). In other words, it is important to consider if the behaviours observed are similar to those which mother and child normally display. Rhule, McMahon & Vando (2009) asked mothers to rate the acceptability and representativeness of the four widely utilised, laboratory-based parent-child interaction tasks and found high levels for all tasks, but consistent differences across tasks. To enhance the ecological validity of the observations, most of them took place at the participants’ homes (75%), although they were given the option to play the game in other locations too.

Likewise, mother and child could have behaved and communicated differently under observation. In an early study, Zegiob, Arnold & Forehand (1975) demonstrated that mothers tend to play more with their children, are more positive in their verbal behaviour and structure their children’s activities more when the observer is present. This could affect the generalisability of information collected during the activity to an activity in the mother’s and child’s normal life. Younger children are least likely to be influenced by an observer (Aspland & Gardner 2003). Even though mother and child were informed about the purpose of the observation and told to ignore my presence while playing the game, the possibility of an observer effect cannot be completely ruled out.
In addition to the potential applications of the board game presented in this pilot study and discussed above, this method might also be useful as part of a multiple method approach. For example, Chisholm et al. (2011) collected data in their study on young children with type 1 diabetes information from four different sources. Diabetic control was assessed through glycosylated haemoglobin levels (HbA1c), dietary adherence through 24-hour recall interviews, perceptions of child adjustment via the Child Behaviour Checklist - Parent Report, and maternal behaviours through the mother-child interaction during the board game. On a larger scale, mother-child pairs of children with food allergies could be studied using interviews with both mother and child about their food choice behaviour. Questionnaires such as the child feeding questionnaire and the parenting styles and dimensions questionnaire used by Blissett & Haycraft (2008) or those measuring child behaviour or parental stress could be used, as well as food diaries or other dietary intake methods in addition to the observational mother-child interaction during the board game. The combination of or association between these different tools could provide a powerful picture of how food allergies effect mother and child behaviour as well as their interaction when choosing food.

5.7 Conclusion and future directions

Despite its nature as a pilot study, several conclusions can be drawn from the findings of this study. Both mother-child dyads of children with and without food allergies show high variability in the way they interact and communicate with each other in the context of food. Similarly, neither mothers of children with food allergies nor those without use a particular parenting style. However, it is possible that mothers of children with food allergies use more verbal and non-verbal directives when communicating with their children. Independent from the allergic condition, highly responsive and affective parents seem likely to encourage their children to produce high levels of engagement, most importantly socialisation outcomes such as cooperation and affect, which has implications for food allergy management between mother and child. More specifically, mothers who display an authoritative parenting style by employing a mix of responsiveness, warmth and demandingness, but not in a controlling
manner, appear to have children with the highest level of engagement and better socialisation outcomes. Such a relationship could lay the foundation for the food-allergic child having a positive relationship towards food by granting the children self-regulation and support instead of overprotection and control in relation to their food choices and also food allergy management. Thus, in conformity with the general developmental approach, a positive maternal communication style should be emphasised as part of paediatric food allergy management.

Considering the small sample size, all these conclusions need further investigation and the results are difficult to extrapolate to the general food-allergic population. Moreover, they raise more questions and open new avenues for future research. Is the high variability of communication and parenting styles within each group due to the small sample size or are there indeed differences between mother-child dyads of children with and without food allergies? Are food allergies a strong determinant for parenting style or are other factors e.g. socio-economic status or ethnicity more influential? How do other factors such as maternal and child characteristics come into play? Are mothers of food-allergic children more likely to use control behaviours than those of non-food-allergic children when choosing food and if yes, what role do anxiety and distress play? Do their children seek more support during food selection than those without food allergies? How do mother and child interact if the child’s food allergies are perceived or the child suffers from non-allergic food hypersensitivities?

In addition to these questions, the observation of mother-child interaction while selecting and classifying food on a board game has proven to be a suitable research method that can be used either individually or in combination with other methods such as questionnaires, interviews or dietary intake assessments. Using a mixed-method approach, for example the triangulation of parenting style and child behavioural questionnaires, qualitative interviews with the mothers, a food diary of the child’s dietary intake, and the board game, would help answering several questions the study has generated.
Chapter 6

Dietary intake of children, teenagers and adults with food allergies

6.1 Overview

This chapter examines the nutritional impact of food allergies on children, teenagers and adults. This was achieved by collecting detailed dietary information over a period of four days. Their results were compared to those of healthy children, teenagers and adults, and the reference nutrient intakes of the UK. Nutrient intake was further investigated in the light of other factors influencing dietary intake. The findings are discussed in terms of their contribution to current literature on dietary intake in the food-allergic population.

6.2 Background

6.2.1 Rationale for the study

Since there is currently no cure for food allergies, eliminating the offending foods from the diet remains the mainstay of food allergy treatment (Boyce et al. 2010). Elimination diets hold a risk of nutritional deficiencies and inadequate child growth (Koletzko & Koletzko 2009). Case reports of children describe both vitamin D and calcium deficient rickets (Bierman, Shapiro, Christie, VanArsdel, Furukawa & Ward 1978, Fox, Du Toit, Lang & Lack 2004, Yu, Pekeles, Legault & McCusker 2006, Noimark & Cox 2008, Pearson,

A number of studies have investigated the nutritional adequacy of elimination diets. However, most of them have been conducted in young children aged six months to four years. One of the earliest studies demonstrated that children on multiple food exclusion diets have significantly lower intakes of calcium than healthy control children (David, Waddington & Stanton 1984). Lower intakes of protein, calcium, phosphorus, magnesium, zinc and riboflavin, but higher intakes of niacin were observed in children with proven cow’s milk allergies when compared to control children in Finland (Paganus, Juntunen-Backman & Savilahti 1992). A population based sample of children on cow’s milk free diets in Norway had lower intakes of energy, fat, protein, calcium, riboflavin and niacin, to such an extent that the recommended guidelines were not met (Henriksen, Eggèsbøe, Halvorsen & Botten 2000). Similarly, low intakes of energy, fat, protein, calcium and phosphorus but higher intakes of vitamin A and C among children on cow’s milk free diet compared with healthy children were found in a Brazilian study (Medeiros, Speridião, Sdepanian, Fagundes-Neto & Morais 2004). In a subgroup analysis of a study evaluating diet and growth in children
with and without eczema, children with cow’s milk allergies had lower intakes of protein and calcium, but higher intakes of energy, fat, vitamin D, vitamin E, vitamin C and iron than their age-matched controls (Laitinen, Kalliomaki, Poussa, Lagstrom & Isolauri 2005). However, it has been shown that children with cow’s milk allergies or multiple food allergies are able to achieve similar mean intakes of nutrients as healthy children when receiving nutrition counselling and substitution of nutritionally equivalent foods (Tiainen et al. 1995, Christie et al. 2002, Seppo, Korpela, Lönnerdal, Metsäniitty, Juntunen-Backman, Klemola, ... & Vanto 2005, Flammarion et al. 2011).

Summarising the evidence from published research studies on dietary intake of the food-allergic population, young children with cow’s milk or multiple food allergies are at greater risk of nutritional deficiencies, particularly in the absence of appropriate nutrition education by a dietician. Calcium has been identified as the key at-risk nutrient, with an effect on bone mineralisation and growth.

As this evidence relates to young children, there is a clear need for studies evaluating dietary intake in children aged four and above, teenagers and adults with food allergies to a wide range of foods. Additionally, none of the previous studies have performed a comprehensive dietary assessment of a wide range of nutrients and minerals. As shown above, food allergies can potentially lead to severe nutritional deficiencies and it is therefore important to investigate its impact on dietary intake. To close these gaps in research, a dietary assessment study in children, teenagers and adults with food allergies to the most common foods causing allergic reactions in the UK (Young et al. 1994, Pereira et al. 2005) and their healthy controls was conducted.

6.2.2 Aim and objectives

The principal aim of this study was to determine the impact of food allergies on dietary intake in children, teenagers and adults with food allergies in order to be able to draw conclusions in terms of their dietary needs.
In order to achieve this aim, the following objectives were set:

- To compare dietary intake of macro- and micronutrients between the food-allergic population and healthy controls.
- To compare dietary intake of macro- and micronutrients between the food-allergic population and healthy controls on subgroups of children, teenagers and adults.
- To assess generalisability of the findings by comparing results of healthy controls of this study to those of the general population.
- To compare dietary intake of macro- and micronutrients of the food-allergic population and healthy controls with UK dietary reference values.

6.2.3 Selecting an appropriate dietary assessment method

The principle methods of dietary assessment at the individual level include 24-hour recall, food record, food frequency questionnaire (FFQ) and diet history. The 24-hour recall and food record are regarded as short-term assessment methods. They are used to collect information on foods actually consumed, either from the preceding day (24-hour recall) or prospectively over one or more days (food records). Information on habitual food consumption, mostly over the previous months or year, is collected with long-term dietary assessment methods such as diet history or FFQ. Each method has its own advantages and disadvantages, a perfect method does not exist (Willett 1998, Biro, Hulshof, Ovesen & Amorim Cruz 2002, Gibson 2005).

Cohort studies have mostly used variations of a FFQ to assess dietary intake, whereas in cross-sectional studies assessing food consumption for a given population or group of individuals, food records or 24-hour recalls have historically been used (Serra-Majem 2009, Willett 1998). Both 24-hour recalls and food records can be used to measure habitual dietary intake given that they are collected over multiple days (Basiotis, Welsh, Cronin, Kelsay & Mertz 1987). However, the number of days recorded are usually restricted to four (Gersovitz, Madden & Smiciklas-Wright 1978) due to respondent fatigue and the high costs for researchers. Atypical days often occur and should be incorporated in the analysis as they
have an impact on mean total intakes of most nutrients (Craig, Kristal, Cheney & Shattuck 2000). The food record has the potential for providing fairly accurate information about food intake as foods are recorded at the time of eating (Bingham, Gill, Welch, Day, Cassidy, Khaw, ... & Day 1994). Although food records have the disadvantage that participants will most likely change their eating patterns from the first day to the last day of keeping their food record (Pao & Cypel 1996), they are often referred to as the “gold standard” of dietary assessment and are frequently used to validate other measurement methods (Ambrosini, de Klerk, O’Sullivan, Beilin & Oddy 2009, Ishihara, Todoriki, Inoue & Tsugane 2009, Watson, Collins, Sibbritt, Dibley & Garg 2009).

In line with previous studies in the food-allergic population, this study used a 4-day estimated food record to measure dietary intake. For practical reasons, it was decided to obtain permission from the Food Standards Agency to be able to use their 4-day estimated food diary developed for the Rolling Programme of the UK National Diet and Nutrition Survey (NDNS) (2008/2009 and 2010/2011), a joint UK-wide initiative between the Food Standards Agency and the Department of Health. The NDNS is a continuous cross-sectional survey, designed to assess the diet, nutrient intake and nutritional status of the general population in the UK (Bates et al. 2012). This 4-day estimated food diary replaced a 7-day weighed record, which was used over many years, but incurred a considerable burden for participants. Prior to its use, the food record (on consecutive days) was compared against four repeat 24h recalls (on non-consecutive days) in 1067 individuals. However, a validation study, for example with a 7-day weighed record or biomarkers as reference method, was not conducted.

The 4-day estimated food record was selected as the dietary assessment tool for this study for the following reasons: (1) it could accommodate any level of food description, thereby enabling details of food and amounts eaten to be obtained (e.g. brand name, cooking techniques, recipes and portion sizes), which was thought to be particularly useful for the food-allergic population; (2) it could be used to measure usual intake as information on dietary intake was collected over several days; (3) it was a flexible method that could also be employed in children and teenagers; (4) it made results from this study comparable to those
of the NDNS.

6.3 Method

The study design is shown as a flow chart in Figure 6.1 and further delineated in the following sections.

Figure 6.1: Flowchart of dietary assessment study
6.3.1 Sample

This is a cross-sectional study that took place in Hampshire and the Isle of Wight between October 2011 and May 2012. The target population for this study were children (4-10 years), teenagers (11-18 years), and adults (19-65 years) with diagnosed food allergies as well as healthy controls. For inclusion in the study, food-allergic participants had to meet the following criteria:

- IgE or non-IgE mediated allergy to at least egg, milk, peanuts, tree nuts, sesame, crustaceans, fish or wheat.

- Diagnosis needed to be confirmed with a positive Skin Prick Test (SPT)/serum specific IgE results plus a convincing clinical history or a positive food challenge.

Participants with multiple food allergies had to have a food allergy to at least one of the allergy specified foods. When method of diagnosis was unknown, participants were contacted by phone and those with a good clinical history that was indicative of food allergies were included. Participants were excluded if they were suffering from another condition that had a marked impact on their dietary intake such as diabetes.

6.3.2 Sample size

The initiated aim of the study was to recruit a total of 150 participants, which was based on a sample size calculation using results on calcium intake (a critical nutrient in patients with milk allergies) from the only previous research study that had been conducted in adults with food allergies (McGowan & Gibney 1993). The sample size calculation was performed using 0.90 as desired statistical power, 0.05 as the significance level, 294 as the assumed variability within the population and 264 as the expected difference between the two groups. The result was a sample size of 52 (~50) for each age group. For age-subgroup analysis, the 150 participants would ideally have been equally distributed across all age groups: 75 cases with food allergies (25 adults, 25 teenagers, 25 children) and 75 healthy controls (25 adults, 25 teenagers, 25 children).
6.3.3 Ethical considerations

Ethical Approval was granted by the NHS Southampton & South West Hampshire Research Ethics Committee A in March 2011 (Appendix 6.1). Following this, Research and Development approval was sought from the Isle of Wight Healthcare NHS Trust, the Portsmouth Hospital NHS Trust, and University Hospital Southampton NHS Foundation Trust. My NHS research passport that I was issued with as part of the first three projects was extended for this study. Written informed consent was obtained from the study participants before the start of data collection (Appendices 6.2 - 6.4). Study participants were informed of their right to withdraw from the study at any time. Other ethical considerations were addressed as described in Section 3.3.2.

6.3.4 Recruitment

Since the target population varied across ages, a multi-modal approach was used for recruitment (Figure 6.2). The food-allergic group was contacted with an invitation letter which was sent through a local support charity ‘The Anaphylaxis Campaign’ or through the NHS Clinics in Portsmouth and the Isle of Wight. The dietician and consultant from the Portsmouth Hospitals NHS Trust, and the dietician from The David Hide Asthma and Allergy Research Centre on the Isle of Wight received invitation letters that they handed out to patients they considered to be eligible to take part. The invitation letter had the study information sheet, consent form and a self-addressed envelope appended (Appendices 6.2 - 6.11). They were asked to return the consent form with contact details if they were interested in taking part in the study. Individual information packages were developed for each age group.

In order to recruit children and teenagers, local schools in Portsmouth and on the Isle of Wight were contacted with a letter, asking if they were happy for their pupils to be approached to take part in the study (Appendices 6.12 and 6.13). One primary school and one secondary school in Portsmouth agreed to collaborate. Information packages were sent out to parent(s)/guardian(s) of children and teenagers, and those interested were asked to return the consent form with contact details (Appendices 6.3, 6.7, 6.8 and 6.10). In the case of teenagers, parent(s)/guardian(s) were asked to hand over the information packages to the...
teenagers if they were happy for their son or daughter to be invited to take part (Appendices 6.4, 6.5 and 6.9 - 6.11). Teenagers were then able to decide themselves if they wished to return the consent form with contact details. Those 16 years and older did not require parental consent.

Participants, mainly those without food allergies, were also approached through advertisements on the University of Portsmouth website (Appendix 6.14). Those who responded to the advertisement received a package consisting of the information sheet, consent form and a stamped self-addressed envelope (Appendices 6.6 - 6.11). They were asked to return the consent form with contact details if they were interested in taking part in the study. Additionally, invitation letters were sent out to participants who had been approached for the previous studies as part of this research (N = 113: 27 adults with food allergies, 29 adults without food allergies, 12 teenagers with food allergies, 32 teenagers without food allergies, 6 children with food allergies, 7 children without food allergies). If they had not responded within two weeks, reminder letters were sent (Appendix 6.15). Once consent forms were received, participants or parents of participants were contacted with a screening questionnaire to assess their eligibility to participate (Appendix 6.16). If two family members expressed interested in taking part, they were both considered. A total of 277 participants returned consent forms. Of these, 185 completed the study.
Support Charity (Anaphylaxis Campaign)
NHS Clinics Portsmouth, Isle of Wight
Local schools Portsmouth, Isle of Wight
Advertisement University of Portsmouth Website
Participants previous studies

243 members contacted
47 adults
143 teenagers
53 children

277 returning consent form

132 adults
32 with food allergies
5 withdrew consent
4 not meeting inclusion criteria
100 with no food allergies
37 withdrew consent
16 did not return diary

101 teenagers
66 with food allergies
16 did not return diary
2 incomplete food diaries
35 with no food allergies
2 did not return diary

44 children
23 with food allergies
2 withdrew consent
3 did not return diary
21 with no food allergies
5 did not return diary

185 included in final analysis

70 adults
23 with food allergies
47 with no food allergies

81 teenagers
48 with food allergies
33 with no food allergies

34 children
18 with food allergies
16 with no food allergies

Figure 6.2: Recruitment of sample
6.3.5 Procedure

Data collection commenced in February 2012 and ended in May 2012. This time period was chosen so that the effect of seasonal variations on dietary intake was reduced. Participants or parents/guardians of participants received a diary package containing a questionnaire, food diary and reply slip by mail. They were instructed to return the questionnaire and food diary in an enclosed envelope once they were completed. Reminder emails and phone calls were made if they had not been received within two weeks. The diaries were reviewed by the researcher upon return and all participants were contacted to prompt for missing details. Although face-to-face interviews when placing and collecting the food diaries might have improved their accuracy, personnel and time constraints did not allow this. Being solely responsible for data collection, I could not afford travelling to participants’ homes that were spread out over Hampshire and the Isle of Wight. Additionally, it would have prolonged the period of data collection for another couple of weeks, which would have had an effect on the time schedule of this research. Participants received a £10 gift voucher to thank them for their time.

6.3.5.1 Survey questionnaires

Questionnaires were constructed to assess information on clinical, dietary, lifestyle and socio-demographic characteristics of participants. The food-allergic group received the ‘Food Allergy Questionnaire’ which included a section with questions on food allergies such as foods avoided, type of allergy (single/multiple), mode of diagnosis of food allergies (SPT, blood test, doctor’s diagnosis, food challenge), and symptoms. General dietary behaviour, lifestyle habits, anthropometric measurements and socio-demographic characteristics were also asked in the ‘Health, Diet and Lifestyle Questionnaire’ that was distributed to healthy controls.

Questions on dietary behaviour included use of dietary supplements (yes/no), type of diet (omnivore, vegetarian, vegan, other), overall variety of diet (different every day, different only sometimes during the week, different only during weekends, does not vary much), parental influence on diet of children and teenagers (5 point scale ranging from
not at all to extremely), and attention paid to diet in terms of healthy eating (5 point scale ranging from not at all to extremely).

Lifestyle questions were only included on questionnaires for teenagers and adults. They assessed current smoking (yes/no), physical activity (performance of at least 30 mins of physical activity per week), and alcohol intake. Teenagers were asked to report their frequency of alcohol intake by selecting one of six categories: almost every day, twice a week, once a week, once a fortnight, once a month, only few times a year, never. For adults, alcohol intake was assessed by asking them to report the amount of drinks they had on their heaviest drinking day the previous week. A drink referred to 125ml of wine, 1/2 a pint of beer and 25ml of spirits.

The socio-demographic section of the questionnaires included questions on age, gender, height, weight, ethnicity (White British, White European, White Other, Black: British Caribbean, Black: British African, Black: British Other, Asian: British Indian, Asian: British Other, Mixed Background, Chinese, Other), own or mother’s qualification (none, GCSE (or equivalent qualification), A-level (or equivalent qualification), graduate level qualification, post-graduate qualification, other), own or mother’s occupation (student, self-employed, full-time employed, part-time employed, retired, unemployed, other), and living area (city, town, village, countryside, other).

Within each group, three sets of questionnaires (children, teenagers, adults) were developed to ask age-appropriate questions. The ‘Food Allergy Questionnaire’ was pre-tested for clarity on patients attending the NHS allergy clinic on the Isle of Wight. They were also reviewed by the local allergy nurses and dietician who have years of experience in asking questions and constructing questionnaires for epidemiological studies. The questionnaires are provided in the Appendices 6.17 - 6.22.
6.3.5.2 Food diaries

As described, dietary data was collected using the 4-day estimated food diaries (adult and child/teenager version) developed for the NDNS (Appendix 6.23 for an example day). Participants were asked to keep a record of everything eaten and drunk over four consecutive days including one weekend day. For children, parents/carers were asked to complete the food diary with assistance from the child if they were willing to. Teenagers were encouraged to complete it themselves but could ask for help if needed. All participants were asked to take their diary with them when away from home.

Food diaries came with detailed instructions on estimating and recording, and diary examples to demonstrate the information. To aid portion size estimation, life size pictures of common instruments including glasses and spoons were provided. The adult diary contained photographs of 15 frequently consumed foods as small, medium and large portion sizes (Nelson, Atkinson & Meyer 1997). Otherwise participants were asked to record household measures, number of items or weight from labels of packaged foods. In addition, they were asked to record brand names and enclose wrappers of unusual foods and ready meals to facilitate coding. They were asked to take leftovers into account when reporting portion sizes. There was a separate section at the end of each day where participants could record recipes for home made dishes. Participants also recorded dietary supplements taken. At the end of the diary, there were a series of questions about usual eating habits such as type of milk or fat spread consumed in case information was insufficient on the recording sheets.

6.3.6 Data analysis

6.3.6.1 Food diary processing

Food diaries were processed using Dietplan 6 (Forestfield Software Limited, Horsham, UK). This is a nutritional analysis programme that may be used with a range of food composition tables (Figure 6.3). Nutrient analysis of this research study was based on the UK National Nutrition Databank that integrates the sixth edition of McCance & Widdowson’s the Composition of Foods (Food Standards Agency 2002b) and its accompanying supplements.
Foods were entered following the FAO INFOODS Guidelines for Food Matching (Stadlmayr, Wijesinha-Bettoni, Haytowitz, Rittenschober, Cunningham, ... & Charrondiere 2011). Information on foods not available in the databases, enclosed wrappers, free from foods and dietary supplements were obtained from the relevant companies and added to the software. If only a few nutrients were listed on food labels, other nutrients for these foods were obtained by extrapolating from data for similar foods. Portion sizes were estimated using coding criteria from the Food Standards Agency’s reference book on Food Portion Sizes (Food Standards Agency 2002a) in adults and age-appropriate portion sizes computed from weighed records in previous NDNS in children (Wrieden, Longbottom, Adamson, Adamson, Ogston, Payne, ... & Barton 2008). A list of weights of common branded foods and foods from fast food outlets provided by the Food Standards Agency was additionally used (Wrieden 2005). Information on nutrition content and portion sizes of school meals was obtained from the caterer’s website. Composite items such as sandwiches were split into separate components. Standard foods were used (e.g. type of chocolate) if foods recorded lacked information for coding. Missing portion sizes were estimated by weight of food consumed on other dietary days or by the participant’s average portion sizes (small, medium, large or age-appropriate).

Recipes were added by entering the individual foods (raw or cooked depending on recipe) and by applying appropriate nutrient retention and weight loss factors for the whole dish. These factors were taken from the McCance and Widdowson’s The Composition of Foods series (Food Standards Agency 2002b).

The data from food diaries was entered into the Dietplan software by myself and two dieticians who received detailed instruction on coding practices and were guided throughout the data entry process by myself. To eliminate interpersonal variability in coding and assessment of portion sizes, I carefully checked all food diaries for coding errors and inadequate portion sizes. Mean energy and nutrient intake per day were calculated for each participant before exporting these values to IBM SPSS Statistics 20 for Windows for further
Figure 6.3: Dietplan interface
analysis. There, the dataset was screened for outliers, checked against food diaries and corrected if necessary.

6.3.6.2 Energy reporting

The Goldberg equation was used to identify participants who have under-reported dietary intakes (Goldberg, Black, Jebb, Cole, Murgatroyd, Coward & Prentice 1991). It is a widely accepted method to evaluate self-reported energy intake. With it, cut-offs for energy intake, below which a person’s energy intake is not considered to be representative of habitual intake, are generated. It is based on the principle that energy intake should equal energy expenditure. Energy requirements can be estimated by adding physical activity levels (PAL) as factors to basal metabolic rate (BMR). The BMR is the energy expenditure of an individual at rest and depends on age, gender and body weight. It was predicted from standard age- and gender-specific equations derived from Schoefield (1985) and given in the Food Agricultural Organisation / World Health Organisation / United Nations University (FAO/WHO/UNU) report on energy and protein requirements (FAO/WHO/UNU 1985) using body weight. Physical activity levels and other data required for calculating the Goldberg cut-offs were taken from Black (2000a). Cut-off values were determined on an individual basis. As only extreme degrees of under-reporting can be detected with the Goldberg equation (Black 2000b), identified under-reporters were not excluded but adjusted for in the final analysis (variable: energy intake/basal metabolic rate).

6.3.6.3 Statistical analysis

Statistical analysis was carried out with IBM SPSS Statistics for Windows (version 20, Armonk, NY: IBM Corp.). To describe sample characteristics, categorical variables were expressed as numbers and percentages while continuous variables were expressed as mean and standard deviation (SD). All continuous variables were tested for normality of distribution using the one-sample Kolmogorov-Smirnov test. Since most of them were not normally distributed, differences between the food-allergic and control group were compared using Mann-Whitney U test. For categorical variables, the $\chi^2$-test was used. Data showing differences in nutrient intake between participants with and without food allergies as stated in the objectives 1 and 2 are presented on a group and age subgroup level.
Body mass index (BMI) was computed by dividing the weight (kg) by the height (m) squared. Dummy variables were created for alcohol intake of teenagers (yes/no), ethnicity (white/other), qualification (low/high), occupation (full/other), and living area (urban/rural). Teenagers who consumed alcohol included those that were drinking on a daily basis, twice a week, once a week, once a fortnight, once a month, or only few times a year. White ethnicity combined White British, White European, White other, whereas Other included ethnic backgrounds such as Black: British Caribbean, Black: British African, Black: British Other; Asian: British Indian, Asian: British Other; Mixed Background, Chinese and other. Qualification was categorised into GCSE or A-levels (low) and (post)graduate education (high). Occupational status was divided into full (full-time employed and self-employed) and other (student, part-time employed, retired or unemployed). Maternal qualification and occupation was used as a proxy for socio-economic status in children and teenagers. City and town was combined to urban living area, while rural living area included villages and countryside.

To meet the objectives 3 and 4, data was analysed against dietary reference values for food energy and nutrients for the United Kingdom (COMA 1991) and results from the NDNS (Bates et al. 2012). Values were expressed as percentages of estimated average requirements (EAR) or reference nutrient intakes (RNI) according to age and gender, and percentage of participants below and above these requirements. The Wilcoxon signed rank test was used to compare nutrient intake of controls in this study to those of the general population (NDNS).

To explore the effect of under-reporting (yes/no), supplement use (yes/no), and irregular coding procedure (yes/no: irregular recording was other than over four consecutive days including one weekend day) on the results of the analysis, nutrient intake between the food-allergic group and controls was compared before and after applying these exclusion criteria using the Mann-Whitney U test.
The impact of food allergies on overall nutrient intake, the first objective of this study, was tested using multivariate analysis of covariance (MANCOVA) with age (years), gender (female/male), energy intake/basal metabolic rate (ratio), BMI (kg/m$^2$), ethnicity (white/other), qualification (low/high), occupation (full/other), living area (urban/rural), supplement use (yes/no), and irregular recording (yes/no) as covariates. To follow up the results of the MANCOVA, each nutrient measure was regressed onto food allergies (yes/no) and confounding factors. The significance level was set at 0.05 for all analyses.

6.4 Results

6.4.1 Description of sample

This study included 187 participants, 91 of whom had food allergies. More than two thirds of those with food allergies had reactions to peanuts (75.8%) and/or tree nuts (70.3%) (Table 6.1). The other main foods indicated were milk (14.3%), eggs (19.8%), sesame (13.2%) and fruits (22.0%). The majority had allergies to more than one food (76.9%).

The food-allergic group slightly differed from the control group in terms of socio-demographic characteristics (Table 6.2). Children and adults with food allergies were significantly older than those without, and there were fewer female in the food allergies than in the control group, particularly among teenagers ($P < 0.05$). BMI was similar in both groups. The percentage of teenagers who consumed alcohol was significantly lower in participants with food allergies (38.0% as opposed to 48.4%). Only one participant reported to be a current smoker.

Eleven out of 187 (5.9%) participants reported having a disease or condition, which included high cholesterol, inflammatory bowel/Crohn’s disease, cyclical vomiting syndrome, arthritis, dysplasia and hypothyroidism, high blood pressure, suspected multiple sclerosis, seborrhoeic dermatitis, autistic spectrum disorders, hayfever and eczema, recurrent urinary tract infections, and suspected epilepsy. As only four of these potentially affect dietary intake (namely high cholesterol, high blood pressure, inflammatory bowel/Crohn’s
### Table 6.1: Characteristics of participants with food allergies

<table>
<thead>
<tr>
<th></th>
<th>All (4-10 years)</th>
<th>Children (11-18 years)</th>
<th>Teenagers (19-65 years)</th>
<th>Adults (19-65 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food allergies (n, %)</strong></td>
<td>91 (48.7)</td>
<td>18 (52.9)</td>
<td>50 (60.2)</td>
<td>23 (32.9)</td>
</tr>
<tr>
<td><strong>Type of allergy (n, %)</strong></td>
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<td></td>
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<td>3 (16.7)</td>
<td>15 (30.0)</td>
<td>3 (13.0)</td>
</tr>
<tr>
<td>Multiple</td>
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<td>15 (83.3)</td>
<td>35 (70.0)</td>
<td>20 (87.0)</td>
</tr>
<tr>
<td><strong>Foods causing allergy (n, %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peanuts</td>
<td>69 (75.8)</td>
<td>11 (61.1)</td>
<td>40 (80.0)</td>
<td>18 (78.3)</td>
</tr>
<tr>
<td>Tree nuts</td>
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<td>14 (77.8)</td>
<td>31 (62.0)</td>
<td>19 (82.6)</td>
</tr>
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<td>5 (27.8)</td>
<td>7 (14.0)</td>
<td>1 (4.3)</td>
</tr>
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<td>7 (38.9)</td>
<td>8 (16.0)</td>
<td>3 (13.0)</td>
</tr>
<tr>
<td>Wheat</td>
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<td>2 (11.1)</td>
<td>1 (2.0)</td>
<td>4 (17.4)</td>
</tr>
<tr>
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<td>5 (10.0)</td>
<td>3 (3.0)</td>
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<td>4 (22.2)</td>
<td>6 (12.0)</td>
<td>2 (8.7)</td>
</tr>
<tr>
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<td>1 (5.6)</td>
<td>2 (4.0)</td>
<td>3 (13.0)</td>
</tr>
<tr>
<td>Fruit</td>
<td>20 (22.0)</td>
<td>5 (27.8)</td>
<td>11 (22.0)</td>
<td>4 (17.4)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>8 (8.8)</td>
<td>1 (5.6)</td>
<td>2 (4.0)</td>
<td>5 (21.7)</td>
</tr>
<tr>
<td>Other*</td>
<td>14 (15.4)</td>
<td>2 (11.1)</td>
<td>6 (12.0)</td>
<td>6 (26.1)</td>
</tr>
</tbody>
</table>

*Other included pulses, seeds, yeast, sulphites, honey, rye

Among participants with food allergies, three reported coeliac disease in addition to at least one other food allergy. Again, since numbers were very low, coeliac disease was not considered in the analysis.

Fifty-four participants (28.9%) were taking medication at the time of the study. The majority of those, 44 (81.9%), were from the food-allergic group and indicated medication relating to asthma, allergy or eczema. Other medication reported included those treating bone diseases, gastrointestinal diseases, high blood pressure, high cholesterol, hypothyroidism, but also painkillers, antidepressants, antibiotics and acne medication were mentioned. As most of these medications do not affect dietary intake, use of medication was
not adjusted for in the final analysis.

A total of 70% of mothers of teenagers with food allergies were in employment other than full-time as opposed to teenagers without food allergies, where more than half of the mothers were reported to be working full-time. Significant differences between the food-allergic and control group were also observed in terms of dietary characteristics. Participants with food allergies had stronger opinions on whether their diet would vary much or not. They also reported paying more attention to healthy eating than those without food allergies (all $P < 0.05$).
Table 6.2: Sample characteristics

<table>
<thead>
<tr>
<th></th>
<th>Food allergies</th>
<th></th>
<th>Controls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (n = 91)</td>
<td>Children (n = 18)</td>
<td>Teenagers (n = 50)</td>
<td>Adults (n = 23)</td>
</tr>
<tr>
<td>Age (y); (\bar{x}, SD)</td>
<td>19.5 (13.8)</td>
<td>8.1 (1.6)</td>
<td>14.5 (2.4)</td>
<td>39.4 (13.7)</td>
</tr>
<tr>
<td>Gender (n, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>46 (50.5)</td>
<td>10 (55.6)</td>
<td>17 (34.0)</td>
<td>19 (82.6)</td>
</tr>
<tr>
<td>Male</td>
<td>45 (49.5)</td>
<td>8 (44.4)</td>
<td>33 (66.0)</td>
<td>4 (17.4)</td>
</tr>
<tr>
<td>BMI (kg/m²); (\bar{x}, SD)</td>
<td>20.4 (4.4)</td>
<td>16.4 (2.5)</td>
<td>20.1 (3.6)</td>
<td>24.5 (4.0)</td>
</tr>
<tr>
<td>Physical activity (d/wk); (\bar{x}, SD)</td>
<td>-</td>
<td>-</td>
<td>4.4 (2.1)</td>
<td>3.4 (2.1)</td>
</tr>
<tr>
<td>Alcohol intake (n, %)</td>
<td>-</td>
<td>-</td>
<td>19 (38.0)</td>
<td>-</td>
</tr>
<tr>
<td>Nr drinks (\bar{x}, SD)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.5 (2.9)</td>
</tr>
<tr>
<td>Smoking (n, %)</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Supplement use (n, %)</td>
<td>24 (26.4)</td>
<td>4 (22.2)</td>
<td>12 (24.0)</td>
<td>8 (34.8)</td>
</tr>
<tr>
<td>Ethnicity (n, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>80 (88.9)</td>
<td>15 (83.3)</td>
<td>43 (87.8)</td>
<td>22 (95.7)</td>
</tr>
<tr>
<td>Other</td>
<td>10 (11.1)</td>
<td>3 (16.7)</td>
<td>6 (12.2)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td>Qualification (n, %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother/Own - High</td>
<td>50 (54.9)</td>
<td>13 (72.2)</td>
<td>25 (50.0)</td>
<td>12 (52.2)</td>
</tr>
<tr>
<td>Mother/Own - Low</td>
<td>41 (45.1)</td>
<td>5 (27.8)</td>
<td>25 (50.0)</td>
<td>11 (47.8)</td>
</tr>
</tbody>
</table>

*p < 0.05 compared to controls, χ²-test or Mann-Whitney U test

*a body mass index

\(\bar{x}\): mean, SD: standard deviation
### Table 6.2: Sample characteristics - continued

<table>
<thead>
<tr>
<th></th>
<th>Food allergies</th>
<th></th>
<th></th>
<th></th>
<th>Controls</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All</td>
<td>Children</td>
<td>Teenagers</td>
<td>Adults</td>
<td>All</td>
<td>Children</td>
<td>Teenagers</td>
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<tr>
<td></td>
<td></td>
<td>(n = 91)</td>
<td>(n = 18)</td>
<td>(n = 50)</td>
<td>(n = 23)</td>
<td>(n = 96)</td>
<td>(n = 16)</td>
<td>(n = 33)</td>
</tr>
<tr>
<td><strong>Occupation (n, %)</strong></td>
<td></td>
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</tr>
<tr>
<td>Mother/Own - Full-time</td>
<td>33 (36.3)</td>
<td>6 (33.3)</td>
<td>15 (30.0)</td>
<td>12 (52.2)</td>
<td>45 (47.4)</td>
<td>3 (18.8)</td>
<td>17 (53.1)</td>
<td>25 (53.2)</td>
</tr>
<tr>
<td>Mother/Own - Other</td>
<td>58 (63.7)</td>
<td>12 (66.7)</td>
<td>35 (70.0)</td>
<td>11 (47.8)</td>
<td>50 (52.6)</td>
<td>13 (81.2)</td>
<td>15 (46.9)</td>
<td>22 (46.8)</td>
</tr>
<tr>
<td><strong>Living area (n, %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>63 (69.2)</td>
<td>10 (55.6)</td>
<td>35 (70.0)</td>
<td>18 (78.3)</td>
<td>76 (80.0)</td>
<td>10 (62.5)</td>
<td>25 (78.1)</td>
<td>41 (87.2)</td>
</tr>
<tr>
<td>Rural</td>
<td>28 (30.8)</td>
<td>8 (44.4)</td>
<td>15 (30.0)</td>
<td>5 (21.7)</td>
<td>19 (20.0)</td>
<td>6 (37.5)</td>
<td>7 (21.9)</td>
<td>6 (12.8)</td>
</tr>
<tr>
<td><strong>Type of diet (n, %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Omnivore</td>
<td>85 (94.4)</td>
<td>16 (94.1)</td>
<td>49 (98.0)</td>
<td>20 (87.0)</td>
<td>85 (88.5)</td>
<td>16 (100)</td>
<td>28 (84.8)</td>
<td>41 (87.2)</td>
</tr>
<tr>
<td>Vegetarian</td>
<td>4 (4.4)</td>
<td>1 (5.9)</td>
<td>1 (2.0)</td>
<td>2 (8.7)</td>
<td>10 (10.4)</td>
<td>0</td>
<td>4 (12.1)</td>
<td>6 (12.8)</td>
</tr>
<tr>
<td>Vegan</td>
<td>1 (1.1)</td>
<td>0</td>
<td>0</td>
<td>1 (4.3)</td>
<td>1 (1.0)</td>
<td>0</td>
<td>1 (3.0)</td>
<td>0</td>
</tr>
<tr>
<td><strong>Variety of diet (n, %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different every day</td>
<td>43 (47.3)</td>
<td>15 (83.3)</td>
<td>19 (38.0)</td>
<td>9 (39.1)</td>
<td>29 (30.2)</td>
<td>3 (18.8)</td>
<td>13 (39.4)</td>
<td>13 (27.7)</td>
</tr>
<tr>
<td>Different during week</td>
<td>10 (11.0)</td>
<td>0</td>
<td>9 (18.0)</td>
<td>1 (4.3)</td>
<td>12 (12.5)</td>
<td>1 (6.2)</td>
<td>5 (15.2)</td>
<td>6 (12.8)</td>
</tr>
<tr>
<td>Different during weekends</td>
<td>10 (11.0)</td>
<td>1 (5.6)</td>
<td>7 (14.0)</td>
<td>2 (8.7)</td>
<td>25 (26.0)</td>
<td>5 (31.2)</td>
<td>8 (24.2)</td>
<td>12 (25.5)</td>
</tr>
<tr>
<td>Does not vary</td>
<td>28 (30.8)</td>
<td>2 (11.1)</td>
<td>15 (30.0)</td>
<td>11 (47.8)</td>
<td>30 (31.2)</td>
<td>7 (43.8)</td>
<td>7 (21.2)</td>
<td>16 (34.0)</td>
</tr>
<tr>
<td><strong>Attention healthy eating (x, SD)</strong></td>
<td>2.7 (1.1)</td>
<td>3.2 (0.8)</td>
<td>2.3 (1.1)</td>
<td>3.2 (0.8)</td>
<td>2.5 (0.9)</td>
<td>2.9 (0.6)</td>
<td>2.2 (1.1)</td>
<td>2.6 (0.8)</td>
</tr>
<tr>
<td><strong>Parental influence (x, SD)</strong></td>
<td>-</td>
<td>-</td>
<td>2.7 (0.9)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.3 (1.2)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Under-reporting (Goldberg) (n, %)</strong></td>
<td>20 (22.5)</td>
<td>1 (5.6)</td>
<td>14 (29.2)</td>
<td>5 (21.7)</td>
<td>18 (18.8)</td>
<td>1 (6.2)</td>
<td>9 (27.3)</td>
<td>8 (17.0)</td>
</tr>
<tr>
<td><strong>Irregular recording (n, %)</strong></td>
<td>19 (20.9)</td>
<td>1 (5.6)</td>
<td>15 (30.0)</td>
<td>3 (13.0)</td>
<td>14 (14.7)</td>
<td>1 (6.2)</td>
<td>5 (15.2)</td>
<td>8 (17.4)</td>
</tr>
</tbody>
</table>

* p < 0.05 compared to controls, χ²-test or Mann-Whitney U test

Food diary recorded on non-consecutive days, including other than 3 weekdays and 1 weekend day
6.4.2 Comparison of macro- and micronutrient intakes between food allergic consumers and healthy controls

Out of 187 food diaries, a total of 185 which were suitable for analysis were received. There was no statistically significant difference in under-reporting between groups (22.5% and 18.8%). Similar numbers were found for participants who did not keep the food diaries over four consecutive days including one weekend day (20.9% with food allergies and 14.7% without food allergies, non-statistically different) (Table 6.2).

Mean nutrient intakes and mean percentages of RNI of the whole sample and split by age group are presented in Tables 6.3 (whole sample), 6.4 (children), 6.5 (teenagers), and 6.6 (adults). Participants with food allergies had equivalent intakes of vitamin A, vitamin C, vitamin D, vitamin E, thiamin, riboflavin, vitamin B6, magnesium and copper to those in the control population across all age categories. Overall, the food-allergic group had lower intakes of energy, fat, sodium, phosphorus and iodine, but higher intakes of carbohydrates, niacin and selenium than the control group (Table 6.3). Subgroup analysis based on age identified lower intakes of protein, vitamin B12, potassium, calcium, phosphorus and iodine, but higher intakes of dietary fibre (non-starch polysaccharides: NSP) among children with food allergies compared to those without (Table 6.4). Teenagers and adults showed less differences in nutrient intake between the two groups. Teenagers with food allergies had lower fat, but higher carbohydrate, niacin and selenium intakes than their healthy peers (Table 6.5). In adults, the food-allergic group had higher intakes of folate and zinc than those without (Table 6.6). However, mean intakes for most nutrients, irrespective of food allergies, met or exceeded recommended levels. Mean intakes of energy and selenium were below recommended levels in all age groups, both with and without food allergies. Additionally, teenagers did not meet RNI for potassium and magnesium, and those with food allergies also had mean iron levels below RNI (Table 6.5). Mean potassium intakes of adults in both groups did not meet the recommended levels (Table 6.6).
Table 6.3: Daily nutrient intake of food-allergic consumers and their healthy controls

<table>
<thead>
<tr>
<th></th>
<th>Food allergies (N = 89)</th>
<th>Controls (N = 96)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>%RNI (SD)</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>1912.0 (465.3)</td>
<td>90.2 (18.8)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>74.9 (24.5)</td>
<td>180.7 (55.4)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>33.3 (5.3)</td>
<td>-</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>252.4 (73.1)</td>
<td>49.6 (7.9)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NSP (g)</td>
<td>14.7 (5.1)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>1008.9 (685.1)</td>
<td>171.4 (118.2)</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>134.9 (134.1)</td>
<td>367.8 (346.0)</td>
</tr>
<tr>
<td>Vitamin D (µg)</td>
<td>5.1 (13.4)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>12.4 (20.3)</td>
<td>-</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>2.6 (3.3)</td>
<td>305.5 (359.3)</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>2.3 (2.6)</td>
<td>204.3 (225.9)</td>
</tr>
<tr>
<td>Niacin equiv. (mg)</td>
<td>33.6 (12.6)</td>
<td>236.8 (75.8)</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>2.6 (1.9)</td>
<td>214.9 (146.3)</td>
</tr>
<tr>
<td>Vitamin B12 (µg)</td>
<td>4.7 (3.5)</td>
<td>361.9 (253.3)</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>280.1 (119.2)</td>
<td>152.5 (65.8)</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>2594.3 (2874.9)</td>
<td>176.0 (61.5)</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>2770.7 (973.3)</td>
<td>96.6 (47.2)</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>937.0 (415.2)</td>
<td>122.6 (51.4)</td>
</tr>
<tr>
<td>Magnesium (µg)</td>
<td>266.9 (88.4)</td>
<td>104.4 (41.5)</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>1263.0 (413.9)</td>
<td>210.8 (71.4)</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>13.1 (5.5)</td>
<td>117.9 (53.2)</td>
</tr>
<tr>
<td>Copper (mg)</td>
<td>1.2 (0.4)</td>
<td>127.0 (45.3)</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>9.8 (4.7)</td>
<td>123.7 (55.3)</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>42.7 (30.8)</td>
<td>84.8 (53.0)</td>
</tr>
<tr>
<td>Iodine (µg)</td>
<td>143.8 (96.8)</td>
<td>109.1 (71.4)</td>
</tr>
</tbody>
</table>

*p < 0.05 compared to controls, Mann-Whitney U test

*a% estimated average requirements (EAR)

SD, standard deviation; RNI, reference nutrient intakes; NSP, non-starch polysaccharides
Table 6.4: Daily nutrient intake of children with food allergies and their healthy controls (4-10 years)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Mean (SD)</th>
<th>%RNI (SD)</th>
<th>Mean (SD)</th>
<th>%RNI (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>(N = 18)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>1769.0 (272.52)</td>
<td>97.8 (12.0)*</td>
<td>1727.3 (194.2)</td>
<td>99.9 (13.4)*</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>62.5 (13.9)</td>
<td>234.8 (54.1)*</td>
<td>63.7 (8.4)</td>
<td>271.8 (52.0)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>63.7 (12.4)</td>
<td>-</td>
<td>66.8 (11.1)</td>
<td>-</td>
</tr>
<tr>
<td>% Total energy</td>
<td>32.6 (4.8)</td>
<td>-</td>
<td>34.8 (4.1)</td>
<td>-</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>250.7 (57.3)</td>
<td>-</td>
<td>232.1 (33.9)</td>
<td>-</td>
</tr>
<tr>
<td>% Total energy</td>
<td>52.8 (6.7)</td>
<td>-</td>
<td>50.3 (4.1)</td>
<td>-</td>
</tr>
<tr>
<td>NSP (g)</td>
<td>15.2 (3.2)*</td>
<td>-</td>
<td>11.6 (3.1)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>1009.7 (587.0)</td>
<td>210.6 (130.3)</td>
<td>812.5 (339.8)</td>
<td>183.3 (83.9)</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>152.3 (52.9)</td>
<td>507.6 (176.3)</td>
<td>147.6 (88.0)</td>
<td>492.0 (293.2)</td>
</tr>
<tr>
<td>Vitamin D (µg)</td>
<td>4.1 (2.5)</td>
<td>-</td>
<td>3.3 (2.2)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>10.4 (4.3)</td>
<td>-</td>
<td>9.0 (6.1)</td>
<td>-</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>2.2 (1.5)</td>
<td>312.8 (210.2)</td>
<td>1.6 (0.4)</td>
<td>226.0 (50.1)</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>1.7 (0.7)</td>
<td>177.8 (70.4)</td>
<td>1.9 (0.5)</td>
<td>213.5 (60.3)</td>
</tr>
<tr>
<td>Niacin equiv. (mg)</td>
<td>23.9 (6.8)</td>
<td>201.4 (55.9)</td>
<td>21.9 (5.9)</td>
<td>189.7 (47.8)</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>2.4 (0.9)</td>
<td>244.4 (104.9)</td>
<td>2.3 (0.9)</td>
<td>238.2 (95.4)</td>
</tr>
<tr>
<td>Vitamin B12 (µg)</td>
<td>3.7 (1.9)</td>
<td>385.9 (193.5)*</td>
<td>4.5 (1.2)</td>
<td>508.2 (149.2)</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>282.6 (82.1)</td>
<td>203.2 (62.3)</td>
<td>244.9 (80.6)</td>
<td>201.8 (80.0)</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>2216.1 (436.4)</td>
<td>207.2 (65.6)</td>
<td>2401.2 (433.6)</td>
<td>275.9 (204.4)</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>2603.5 (579.1)</td>
<td>149.9 (64.9)*</td>
<td>2608.6 (638.8)</td>
<td>176.8 (48.8)</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>854.0 (209.5)</td>
<td>161.0 (40.8)*</td>
<td>1009.2 (233.8)</td>
<td>203.9 (53.1)</td>
</tr>
<tr>
<td>Magnesium (µg)</td>
<td>255.2 (55.9)</td>
<td>142.7 (48.1)</td>
<td>226.1 (52.2)</td>
<td>146.9 (37.9)</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>1109.0 (259.7)</td>
<td>257.3 (62.0)*</td>
<td>1216.6 (164.0)</td>
<td>307.9 (51.5)</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>12.3 (3.6)</td>
<td>151.0 (46.4)</td>
<td>9.7 (2.2)</td>
<td>133.5 (33.8)</td>
</tr>
<tr>
<td>Copper (mg)</td>
<td>1.0 (0.3)</td>
<td>149.0 (39.8)</td>
<td>0.8 (0.2)</td>
<td>124.4 (30.0)</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>8.1 (2.9)</td>
<td>116.8 (41.9)</td>
<td>7.5 (1.3)</td>
<td>111.8 (18.9)</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>26.0 (10.3)</td>
<td>95.7 (53.0)</td>
<td>25.8 (10.8)</td>
<td>103.2 (35.4)</td>
</tr>
<tr>
<td>Iodine (µg)</td>
<td>118.6 (59.4)</td>
<td>109.7 (55.2)*</td>
<td>187.3 (45.0)</td>
<td>178.9 (44.8)</td>
</tr>
</tbody>
</table>

* p < 0.05 compared to controls, Mann-Whitney U test  
% estimated average requirements (EAR)  
SD, standard deviation; RNI, reference nutrient intakes; NSP, non-starch polysaccharides
Table 6.5: Daily nutrient intake of teenagers with food allergies and their healthy controls (11-18 years)

<table>
<thead>
<tr>
<th></th>
<th>Teenagers with food allergies (N = 48)</th>
<th>Controls (N = 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>%RNI (SD)</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>1951.7 (485.8)</td>
<td>84.8 (18.2)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>77.1 (25.8)</td>
<td>165.7 (47.3)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>73.9 (24.9)</td>
<td>-</td>
</tr>
<tr>
<td>% Total energy</td>
<td>33.8 (5.2)</td>
<td>-</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>258.3 (62.6)</td>
<td>-</td>
</tr>
<tr>
<td>% Total energy</td>
<td>49.9 (5.8)</td>
<td>-</td>
</tr>
<tr>
<td>NSP (g)</td>
<td>13.7 (5.0)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>913.3 (571.4)</td>
<td>145.1 (83.9)</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>113.3 (61.8)</td>
<td>292.5 (158.3)</td>
</tr>
<tr>
<td>Vitamin D (µg)</td>
<td>6.2 (18.1)</td>
<td>-</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>9.5 (9.0)</td>
<td>-</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>2.5 (3.8)</td>
<td>269.1 (378.2)</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>2.3 (3.0)</td>
<td>193.6 (248.9)</td>
</tr>
<tr>
<td>Niacin equiv. (mg)</td>
<td>37.7 (12.9)</td>
<td>245.7 (72.9)</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>2.4 (1.7)</td>
<td>186.2 (116.1)</td>
</tr>
<tr>
<td>Vitamin B12 (µg)</td>
<td>4.6 (3.4)</td>
<td>341.7 (253.7)</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>249.9 (106.3)</td>
<td>125.0 (53.1)</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>2610.2 (943.0)</td>
<td>163.1 (58.9)</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>2581.1 (717.8)</td>
<td>77.9 (20.8)</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>972.9 (509.7)</td>
<td>103.6 (49.8)</td>
</tr>
<tr>
<td>Magnesium (µg)</td>
<td>248.8 (80.4)</td>
<td>85.5 (27.3)</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>1273.1 (473.5)</td>
<td>175.8 (58.9)</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>12.2 (4.8)</td>
<td>101.0 (46.0)</td>
</tr>
<tr>
<td>Copper (mg)</td>
<td>1.1 (0.4)</td>
<td>123.4 (45.1)</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>9.5 (5.2)</td>
<td>110.0 (54.4)</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>47.8 (31.1)</td>
<td>85.3 (49.6)</td>
</tr>
<tr>
<td>Iodine (µg)</td>
<td>149.5 (115.9)</td>
<td>110.0 (84.6)</td>
</tr>
</tbody>
</table>

*p < 0.05 compared to controls, Mann-Whitney U test

a% estimated average requirements (EAR)

SD, standard deviation; RNI, reference nutrient intakes; NSP, non-starch polysaccharides
Table 6.6: Daily nutrient intake of adults with food allergies and their healthy controls (19-65 years)

<table>
<thead>
<tr>
<th>Adults with food allergies (N = 23)</th>
<th>Controls (N = 47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>%RNI (SD)</td>
</tr>
<tr>
<td>Energy (kcal)</td>
<td>1941.2 (532.4)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>80.1 (26.3)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>70.1 (26.3)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>32.9 (5.9)</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>241.2 (101.2)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>46.4 (11.0)</td>
</tr>
<tr>
<td>NSP (g)</td>
<td>16.4 (6.3)</td>
</tr>
<tr>
<td>Vitamin A (µg)</td>
<td>1195.3 (927.1)</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>166.2 (243.5)</td>
</tr>
<tr>
<td>Vitamin D (µg)</td>
<td>3.4 (2.8)</td>
</tr>
<tr>
<td>Vitamin E (mg)</td>
<td>20.1 (37.1)</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>3.1 (3.3)</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>2.8 (2.8)</td>
</tr>
<tr>
<td>Niacin equiv. (mg)</td>
<td>32.8 (11.3)</td>
</tr>
<tr>
<td>Vitamin B6 (mg)</td>
<td>3.1 (2.5)</td>
</tr>
<tr>
<td>Vitamin B12 (µg)</td>
<td>5.8 (4.5)</td>
</tr>
<tr>
<td>Folate (µg)</td>
<td>340.9 (147.0)</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td>2857.3 (908.0)</td>
</tr>
<tr>
<td>Potassium (mg)</td>
<td>3297.3 (1428.0)</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>927.0 (303.3)</td>
</tr>
<tr>
<td>Magnesium (µg)</td>
<td>313.7 (109.2)</td>
</tr>
<tr>
<td>Phosphorus (mg)</td>
<td>1362.4 (352.4)</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>15.6 (7.4)</td>
</tr>
<tr>
<td>Copper (mg)</td>
<td>1.4 (0.6)</td>
</tr>
<tr>
<td>Zinc (mg)</td>
<td>11.7 (4.2)</td>
</tr>
<tr>
<td>Selenium (µg)</td>
<td>46.8 (36.4)</td>
</tr>
<tr>
<td>Iodine (µg)</td>
<td>150.0 (73.6)</td>
</tr>
</tbody>
</table>

*p < 0.05 compared to controls, Mann-Whitney U test
*% estimated average requirements (EAR)
SD, standard deviation; RNI, reference nutrient intakes; NSP, non-starch polysaccharides
6.4.3 Comparison with the National Diet and Nutrition Survey (NDNS) (2008/09 - 2010/11)

To assess the generalisability of the data obtained in this study, nutrient intakes of healthy controls from this study were compared to the results from the NDNS Rolling Programme (2008/09 - 2010/11) (Bates et al. 2012, Sadler, Nicholson, Steer, Gill, Bates, Tipping, Cox, Lennox & Prentice 2011). Although statistically significant differences between the two datasets were found for most nutrients (Table 6.7), they can largely be explained by the lower energy intake of the NDNS population. Both studies identified similar nutrients as critical for specific age groups. Potassium and magnesium intakes were below or just above recommendations for teenagers and adults in both NDNS and this study. Teenagers also showed low intakes of calcium, iodine and iron. In contrast to those in the NDNS, zinc intakes among children and teenagers in this study were slightly above recommended levels. Selenium was a critical nutrient at all age levels in both datasets. Intakes of vitamin D and E were not assessed in 19-64 year olds in the NDNS, and data on sodium intake was only available for adults.

6.4.4 Comparison to UK dietary reference values

Results from comparing the percentage of participants who met the dietary recommendations to those who did not, support findings from the previous analyses in this study. They are shown in Table 6.8. Most participants met or were above the requirements for protein, vitamin C, thiamin, niacin equivalents, vitamin B6, vitamin B12, sodium and phosphorus irrespective of food allergies. The percentage of participants with energy intakes below recommended levels was significantly higher in subjects with food allergies compared to those without. Around 25% of all participants did not meet the recommendations for vitamin A, riboflavin and folate. Potassium and magnesium were low among the majority of teenagers. Similar results were observed in adults, although fewer failed to meet the recommendation for magnesium. More participants with food allergies than those without had consumed below recommended levels for calcium, zinc and iodine. Those falling below calcium and zinc recommendations were mainly teenagers, whereas iodine intakes lower than RNI affected
Table 6.7: Daily nutrient intake (including dietary supplements) from the National Diet and Nutrition Survey (NDNS) (2008/09 and 2010/11) as compared to healthy controls form this study

<table>
<thead>
<tr>
<th>All</th>
<th>Children</th>
<th>Teenagers</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>(N = 2465)</td>
<td>(N = 613)</td>
<td>(N = 666)</td>
<td>(N = 1186)</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)</td>
<td>1743 (477)</td>
<td>1555 (311)</td>
<td>1791 (491)</td>
<td>1882 (628)</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>65.7 (20.3)</td>
<td>55.8 (12.8)</td>
<td>65.7 (19.6)</td>
<td>75.7 (28.4)</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>65.2 (21.7)</td>
<td>58.4 (15.4)</td>
<td>67.9 (21.9)</td>
<td>69.4 (27.8)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>33.5 (5.4)</td>
<td>33.6 (4.6)</td>
<td>33.9 (4.9)</td>
<td>32.9 (6.6)</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>226 (63)</td>
<td>215 (45)</td>
<td>239 (69)</td>
<td>225 (75)</td>
</tr>
<tr>
<td>% Total energy</td>
<td>49.2 (6.0)</td>
<td>51.9 (4.8)</td>
<td>50.3 (5.6)</td>
<td>45.5 (7.7)</td>
</tr>
<tr>
<td>NSP (g)</td>
<td>12.3 (4.1)</td>
<td>11.3 (3.2)</td>
<td>11.8 (4.0)</td>
<td>13.8 (5.1)</td>
</tr>
<tr>
<td>Vitamin A (%RNI)</td>
<td>147 (125)</td>
<td>162 (118)</td>
<td>111 (91)</td>
<td>167 (167)</td>
</tr>
<tr>
<td>Vitamin C (%RNI)</td>
<td>272 (240)</td>
<td>315 (188)</td>
<td>230 (188)</td>
<td>271 (344)</td>
</tr>
<tr>
<td>Thiamin (%RNI)</td>
<td>194 (209)</td>
<td>190 (57)</td>
<td>165 (59)</td>
<td>226 (510)</td>
</tr>
<tr>
<td>Riboflavin (%RNI)</td>
<td>153 (152)</td>
<td>170 (64)</td>
<td>122 (56)</td>
<td>167 (335)</td>
</tr>
<tr>
<td>Niacin Equiv. (%RNI)</td>
<td>243 (87)</td>
<td>234 (66)</td>
<td>226 (81)</td>
<td>268 (114)</td>
</tr>
<tr>
<td>Vitamin B6 (%RNI)</td>
<td>199 (176)</td>
<td>196 (76)</td>
<td>180 (112)</td>
<td>220 (339)</td>
</tr>
<tr>
<td>Vitamin B12 (%RNI)</td>
<td>378 (270)</td>
<td>445 (210)</td>
<td>306 (163)</td>
<td>384 (436)</td>
</tr>
<tr>
<td>Folate (%RNI)</td>
<td>139 (70)</td>
<td>165 (70)</td>
<td>108 (46)</td>
<td>145 (95)</td>
</tr>
<tr>
<td>Sodium (mg)</td>
<td></td>
<td></td>
<td>3240 (2320)</td>
<td></td>
</tr>
<tr>
<td>Potassium (%RNI)</td>
<td>99 (33)</td>
<td>146 (52)</td>
<td>70 (21)</td>
<td>80 (26)</td>
</tr>
<tr>
<td>Calcium (%RNI)</td>
<td>122 (45)</td>
<td>161 (54)</td>
<td>86 (32)</td>
<td>119 (48)</td>
</tr>
<tr>
<td>Magnesium (%RNI)</td>
<td>96 (32)</td>
<td>125 (41)</td>
<td>72 (22)</td>
<td>92 (33)</td>
</tr>
<tr>
<td>Iron (%RNI)</td>
<td>107 (56)</td>
<td>121 (39)</td>
<td>78 (34)</td>
<td>121 (95)</td>
</tr>
<tr>
<td>Copper (%RNI)</td>
<td>110 (45)</td>
<td>124 (42)</td>
<td>106 (38)</td>
<td>101 (55)</td>
</tr>
<tr>
<td>Zinc (%RNI)</td>
<td>102 (44)</td>
<td>99 (34)</td>
<td>89 (32)</td>
<td>119 (66)</td>
</tr>
<tr>
<td>Selenium (%RNI)</td>
<td>94 (38)</td>
<td>133 (45)</td>
<td>75 (30)</td>
<td>75 (38)</td>
</tr>
<tr>
<td>Iodine (%RNI)</td>
<td>117 (57)</td>
<td>135 (60)</td>
<td>93 (48)</td>
<td>122 (64)</td>
</tr>
</tbody>
</table>

*p < 0.05 compared to controls of this study, Wilcoxon signed-rank test
\(\triangleright\)NDNS intakes lower than controls of this study
\(\triangleleft\)NDNS intakes higher than controls of this study
SD, standard deviation; RNI, reference nutrient intakes; NSP, non-starch polysaccharides
\(a\)estimated using the equation 17.1mmol of sodium = 1g of salt

half of the children with food allergies. Meeting RNI levels for iron was a bigger problem in teenagers and adults without food allergies, but also around 40-50% of those with
food allergies were below recommendations. The percentage of adults who did not meet recommended levels for copper were equivalent between the two groups. The most critical nutrient was selenium, with the majority of participants below recommended levels, particularly those without food allergies. Reference nutrient intakes for vitamin D and E do not exist for the age groups studied.

Table 6.8: Percentage of participants below reference nutrient intake (RNI) requirements

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>All (n = 185)</th>
<th>Children (4-10 years) (n = 34)</th>
<th>Teenagers (11-18 years) (n = 81)</th>
<th>Adults (19-65 years) (n = 70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (n, %)</td>
<td>FA 65 (73.0)</td>
<td>11 (61.1)</td>
<td>40 (83.3)</td>
<td>14 (60.9)</td>
</tr>
<tr>
<td></td>
<td>NFA 53 (55.2)</td>
<td>7 (43.8)</td>
<td>23 (69.7)</td>
<td>23 (48.9)</td>
</tr>
<tr>
<td>Protein (n, %)</td>
<td>FA 2 (2.2)</td>
<td>0</td>
<td>0</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td></td>
<td>NFA 2 (2.1)</td>
<td>0</td>
<td>0</td>
<td>2 (4.3)</td>
</tr>
<tr>
<td>Vitamin A (n, %)</td>
<td>FA 22 (24.7)</td>
<td>2 (11.1)</td>
<td>14 (29.2)</td>
<td>6 (26.1)</td>
</tr>
<tr>
<td></td>
<td>NFA 25 (26.0)</td>
<td>2 (12.5)</td>
<td>12 (36.4)</td>
<td>11 (23.4)</td>
</tr>
<tr>
<td>Vitamin C (n, %)</td>
<td>FA 6 (6.7)</td>
<td>0</td>
<td>2 (4.2)</td>
<td>4 (17.4)</td>
</tr>
<tr>
<td></td>
<td>NFA 8 (8.3)</td>
<td>0</td>
<td>2 (6.1)</td>
<td>6 (12.8)</td>
</tr>
<tr>
<td>Thiamin (n, %)</td>
<td>FA 3 (3.4)</td>
<td>0</td>
<td>3 (6.2)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NFA 1 (1.0)</td>
<td>0</td>
<td>0</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td>Riboflavin (n, %)</td>
<td>FA 17 (19.1)</td>
<td>2 (11.1)</td>
<td>13 (27.1)</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td></td>
<td>NFA 14 (14.6)</td>
<td>0</td>
<td>9 (27.3)</td>
<td>5 (10.6)</td>
</tr>
<tr>
<td>Niacin Equiv. (n, %)</td>
<td>FA 2 (2.2)</td>
<td>1 (5.3)</td>
<td>0</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td></td>
<td>NFA 4 (4.2)</td>
<td>1 (6.3)</td>
<td>3 (9.1)</td>
<td>0</td>
</tr>
<tr>
<td>Vitamin B6 (n, %)</td>
<td>FA 4 (4.5)</td>
<td>0</td>
<td>3 (6.2)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td></td>
<td>NFA 7 (7.3)</td>
<td>0</td>
<td>5 (15.2)</td>
<td>2 (4.3)</td>
</tr>
<tr>
<td>Vitamin B12 (n, %)</td>
<td>FA 3 (3.4)</td>
<td>0</td>
<td>2 (4.2)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td></td>
<td>NFA 3 (3.1)</td>
<td>0</td>
<td>1 (3.0)</td>
<td>2 (4.3)</td>
</tr>
<tr>
<td>Folate (n, %)</td>
<td>FA 18 (20.2)</td>
<td>0</td>
<td>16 (33.3)</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td></td>
<td>NFA 24 (25.0)</td>
<td>0</td>
<td>9 (27.3)</td>
<td>15 (31.9)</td>
</tr>
<tr>
<td>Sodium (n, %)</td>
<td>FA 5 (5.6)</td>
<td>0</td>
<td>4 (8.3)</td>
<td>1 (4.3)</td>
</tr>
<tr>
<td></td>
<td>NFA 1 (1.0)</td>
<td>0</td>
<td>0</td>
<td>1 (2.1)</td>
</tr>
</tbody>
</table>

FA, Food allergies; NFA, No food allergies

*P < 0.05 compared to controls, χ²-test

% below estimated average requirements (EAR)
Table 6.8: Percentage of participants below reference nutrient intake (RNI) requirements - continued

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>All (n = 185)</th>
<th>Children (4-10 years) (n = 34)</th>
<th>Teenagers (11-18 years) (n = 81)</th>
<th>Adults (19-65 years) (n = 70)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potassium (n, %)</td>
<td>FA 61 (68.5)</td>
<td>3 (16.7)</td>
<td>41 (85.4)</td>
<td>17 (73.9)</td>
</tr>
<tr>
<td></td>
<td>NFA 57 (59.4)</td>
<td>0</td>
<td>25 (75.8)</td>
<td>32 (68.1)</td>
</tr>
<tr>
<td>Iron (n, %)</td>
<td>FA 38 (42.7)</td>
<td>2 (11.1)</td>
<td>27 (56.2)</td>
<td>9 (39.1)</td>
</tr>
<tr>
<td></td>
<td>NFA 56 (58.3)</td>
<td>3 (18.8)</td>
<td>23 (69.7)</td>
<td>30 (63.8)</td>
</tr>
<tr>
<td>Copper (n, %)</td>
<td>FA 27 (30.3)</td>
<td>2 (11.1)</td>
<td>14 (29.2)</td>
<td>11 (47.8)</td>
</tr>
<tr>
<td></td>
<td>NFA 34 (35.4)</td>
<td>4 (25.0)</td>
<td>9 (27.3)</td>
<td>21 (44.7)</td>
</tr>
<tr>
<td>Zinc (n, %)</td>
<td>FA 37 (41.6)</td>
<td>7 (38.9)</td>
<td>28 (58.3)</td>
<td>2 (8.7)</td>
</tr>
<tr>
<td></td>
<td>NFA 24 (25.0)</td>
<td>3 (18.8)</td>
<td>14 (42.4)</td>
<td>7 (14.9)</td>
</tr>
<tr>
<td>Selenium (n, %)</td>
<td>FA 63 (70.8)</td>
<td>11 (61.1)</td>
<td>36 (75.0)</td>
<td>16 (69.6)</td>
</tr>
<tr>
<td></td>
<td>NFA 81 (84.4)</td>
<td>9 (56.2)</td>
<td>29 (87.9)</td>
<td>43 (91.5)</td>
</tr>
<tr>
<td>Iodine (n, %)</td>
<td>FA 49 (55.1)</td>
<td>9 (50.0)</td>
<td>28 (58.3)</td>
<td>12 (52.2)</td>
</tr>
<tr>
<td></td>
<td>NFA 39 (40.6)</td>
<td>0</td>
<td>17 (51.5)</td>
<td>22 (46.8)</td>
</tr>
<tr>
<td>Calcium (n, %)</td>
<td>FA 34 (38.2)</td>
<td>1 (5.6)</td>
<td>27 (56.2)</td>
<td>6 (26.1)</td>
</tr>
<tr>
<td></td>
<td>NFA 20 (20.8)</td>
<td>0</td>
<td>12 (36.4)</td>
<td>8 (17.0)</td>
</tr>
<tr>
<td>Magnesium (n, %)</td>
<td>FA 50 (56.2)</td>
<td>3 (16.7)</td>
<td>39 (81.2)</td>
<td>8 (34.8)</td>
</tr>
<tr>
<td></td>
<td>NFA 42 (43.8)</td>
<td>1 (6.2)</td>
<td>21 (63.6)</td>
<td>20 (42.6)</td>
</tr>
<tr>
<td>Phosphorus (n, %)</td>
<td>FA 0</td>
<td>1 (5.6)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>NFA 0</td>
<td>1 (6.2)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

FA, Food allergies; NFA, No food allergies

*p < 0.05 compared to controls, χ²-test

6.4.5 Multivariate statistical analysis

In order to assess whether differences between the food-allergic group and healthy controls persisted when controlling for other factors influencing dietary behaviour, multivariate statistical analysis was carried out.

6.4.5.1 Evaluation of assumptions

Prior to analysis, the dataset was carefully screened and checked for assumptions so that the statistical models would be generalisable to the population studied. Multivariate analy-
sis of covariance (MANCOVA) requires that the dependent variables conform to parametric assumptions in each group. Therefore, all nutrients that did not follow a normal distribution when tested with the Kolmogorov-Smirnov Test (KS test) were logarithmically transformed (ln) to account for skewed distributions. These included protein, thiamin, riboflavin, vitamin B6, vitamin B12, vitamin A, vitamin C, vitamin D, vitamin E, calcium, sodium, iron and selenium. After transformation, the KS test was still significant for thiamin and sodium. Independence of error was tested with the Durban-Watson statistics, with values between 1 and 3 considered to be unproblematic in terms of correlation of residuals. Linearity, normality and homoscedascity of residuals were checked by examining Q-Q plots, histograms and scatterplots respectively. If correlations between independent variables were no greater than 9, and the VIF (variance inflation factor) value, an indicator for strong relationships between predictors, was close to 1, but no greater than 10, no perfect multicollinearity was assumed. Possible outliers were identified by checking all cases for standardised residuals between ± 2 standard deviations. Those cases that were falling outside these 2 standard deviations were further examined by Cook’s Distance and standardised DFBeta. All values that were below 1 were considered as non-influential on the model (Cook’s distance) and the regression parameter (standardized DFBeta) (Field 2005). Using these criteria, no outliers among the cases were found. Seven cases had missing data, which resulted in 180 cases being included in both MANCOVA and multiple regression analysis.

6.4.5.2 Selection of predictors

Potential confounding variables were selected based on past research, theoretical importance and preceding analysis. Age, gender, ethnicity, urbanisation and socio-economic factors are well-established determinants for dietary intake among all age groups (Rasmussen, Krølner, Klepp, Lytle, Brug, Bere & Due 2006, Xie, Gilliland, Li & Rockett 2003). In children, the socio-economic status of the mother is strongly linked to children’s nutrition patterns (Gaina, Sekine, Chandola, Marmot & Kagamimori 2009). It has been shown that teenagers are able to report their mother’s socio-economic background with relatively high validity; more so than that of fathers (Ensminger, Forrest, Riley, Kang, Green, Starfield & Ryan 2000). Consequently, only information on the mother’s qualification and
occupation was used for analysis. Lifestyle factors including smoking, physical activity and alcohol intake also play key roles in dietary intake (Moreno-Gómez, Romaguera-Bosch, Tauler-Riera, Bennasar-Veny, Pericas-Beltran, Martinez-Andreu & Aguilo-Pons 2012, Chapman, Benedict, Brooks & Schiöth 2012). However, data for these confounding factors are generally not meaningful in children and were therefore only collected in teenagers and adults. Additionally, sample sizes per age group were relatively small, which made separate analyses not feasible. BMI is a known predictor for misreporting (Kretsch, Fong & Green 1999) and was accordingly taken into consideration.

All other factors (under-reporting, supplement use, irregular recording) were explored in preceding analyses. This was done by comparing the results of the Mann-Whitney U test on the whole sample with those that were received when either supplement users, under-reporters or irregular recorders were excluded. Table 6.9 gives an overview of nutrients that were statistically different between participants with food allergies and their controls when applying these exclusion criteria. Since all of them had an independent influence on the results, they were added to the list of covariates. In the case of under-reporting, the variable energy intake / basal metabolic rate, a ratio that accounts for energy requirements depending on age, gender and body size was used. On the recommendation of a recent review (Poslusna, Ruprich, de Vries, Jakubikova & van’t Veer 2009), under-reporters should not be excluded from the analysis as it introduces a source of unknown bias into the dataset. One way to handle this issue is to adjust for energy intake using the residual method with usage of regression analysis (Poslusna et al. 2009).

6.4.5.3 Results of a MANCOVA to assess the relationship between overall nutrient intake and food allergies

A MANCOVA was conducted to compare the overall nutrient intake between food-allergic and non-food-allergic consumers. This method takes into account the relationships of all nutrients, which were entered as dependent variables into the analysis. Adjustment was made for 11 covariates: age, gender, energy intake / basal metabolic rate, body mass index,
ethnicity, qualification, occupation, living area, supplement use and irregular recording. Food allergies yes/no was used as the independent variable. Although all variables that did not follow a normal distribution were subjected to natural logarithmic transformation, the Box’s M test for homogeneity of variance-covariance matrices was significant. Since Box’s M is a very sensitive test and sample sizes were roughly equal, the outcome of the Box’s M test can be disregarded, and results of the MANCOVA are assumed to be robust. In this case, multivariate significance is best evaluated using Pillai’s trace criterion (Tabachnick & Fidell 2007).

With the use of Pillai’s trace criterion, the omnibus MANCOVA was significant, $F(25, 144) = 2.351$, $p = 0.001$, partial $\eta^2 = 0.290$. From this result it can be concluded that food allergies have an effect on nutrient intake. Food allergies accounted for about 29% of variance in nutrient intake after adjustment for the variance of other influencing factors described above. To determine more specifically which nutrients contributed to the overall effect, MANCOVA was followed by multiple regression analysis.
6.4.5.4 Results of multiple regression to assess the relationship between individual nutrient intake and food allergies

Multiple regression and MANCOVA are similar in that they have several independent variables (Tabachnick & Fidell 2007). Therefore, multiple regression was considered an appropriate method for further investigating the results of the MANCOVA. This analysis can establish which nutrients are individually associated with food allergies when controlling for other effects. Nutrients were used as dependent variables and food allergies yes/no, age, gender, energy intake/basal metabolic rate, body mass index, ethnicity, qualification, occupation, living area, supplement use, and irregular recording used as independent variables; these were added by the “forced entry” method in the same block to each model. Results for the comparison between food allergies yes/no are presented in Table 6.10. Based on this analysis, food allergies are shown to have an effect on six nutrients including fat, niacin equivalents, sodium, calcium, phosphorus and iodine (p < 0.05). Subjects with food allergies had 2.5% lower intakes of fat compared to their healthy controls. Intakes of niacin equivalents were substantially higher in the food-allergic group (27.6%). All other nutrients were lower than in the group without food allergies, sodium by 15.1%, calcium by 12.7%, phosphorus by 19.0% and iodine by 27.3%. The R²-values for the general model ranged from 0.093 - 0.387, indicating that all explanatory factors that were entered into the model explain 9.3% - 38.7% of the variance of the respective nutrient.
Table 6.10: Results of multiple regression for relationship between nutrients (%RNI) and food allergies\(^a\) (n = 180)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Regression coefficient</th>
<th>95% CI</th>
<th>p</th>
<th>R(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>4.681</td>
<td>-0.852</td>
<td>10.215</td>
<td>0.097</td>
</tr>
<tr>
<td>Protein</td>
<td>0.010</td>
<td>-0.067</td>
<td>0.086</td>
<td>0.803</td>
</tr>
<tr>
<td>Fat(b,c)</td>
<td>2.459(^\ast)</td>
<td>0.854</td>
<td>4.065</td>
<td>0.003</td>
</tr>
<tr>
<td>Carbohydrates(^b)</td>
<td>-1.815</td>
<td>-3.747</td>
<td>0.117</td>
<td>0.065</td>
</tr>
<tr>
<td>NSP(^d)</td>
<td>1.321</td>
<td>-2.787</td>
<td>0.146</td>
<td>0.077</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>0.001</td>
<td>-0.186</td>
<td>0.188</td>
<td>0.991</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>-0.028</td>
<td>-0.223</td>
<td>0.168</td>
<td>0.780</td>
</tr>
<tr>
<td>Vitamin D</td>
<td>-0.124</td>
<td>-0.366</td>
<td>0.119</td>
<td>0.315</td>
</tr>
<tr>
<td>Vitamin E</td>
<td>-0.067</td>
<td>-0.223</td>
<td>0.090</td>
<td>0.403</td>
</tr>
<tr>
<td>Thiamin</td>
<td>-0.056</td>
<td>-0.227</td>
<td>0.116</td>
<td>0.523</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.036</td>
<td>-0.106</td>
<td>0.178</td>
<td>0.616</td>
</tr>
<tr>
<td>Niacin equiv.</td>
<td>-27.558(^\ast)</td>
<td>-47.869</td>
<td>7.246</td>
<td>0.008</td>
</tr>
<tr>
<td>Vitamin B6</td>
<td>-0.054</td>
<td>-0.172</td>
<td>0.064</td>
<td>0.364</td>
</tr>
<tr>
<td>Vitamin B12</td>
<td>0.066</td>
<td>-0.109</td>
<td>0.241</td>
<td>0.458</td>
</tr>
<tr>
<td>Folate</td>
<td>0.853</td>
<td>-17.051</td>
<td>18.758</td>
<td>0.925</td>
</tr>
<tr>
<td>Sodium</td>
<td>0.141(^\ast)</td>
<td>0.045</td>
<td>0.237</td>
<td>0.004</td>
</tr>
<tr>
<td>Potassium</td>
<td>0.063</td>
<td>-0.033</td>
<td>0.160</td>
<td>0.197</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.120(^\ast)</td>
<td>0.009</td>
<td>0.231</td>
<td>0.034</td>
</tr>
<tr>
<td>Magnesium</td>
<td>4.284</td>
<td>-5.466</td>
<td>14.035</td>
<td>0.387</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>19.047(^\ast)</td>
<td>1.268</td>
<td>36.825</td>
<td>0.036</td>
</tr>
<tr>
<td>Iron</td>
<td>-0.074</td>
<td>-0.182</td>
<td>0.034</td>
<td>0.179</td>
</tr>
<tr>
<td>Copper</td>
<td>-2.978</td>
<td>-15.265</td>
<td>9.309</td>
<td>0.633</td>
</tr>
<tr>
<td>Zinc</td>
<td>-7.514</td>
<td>-19.988</td>
<td>4.961</td>
<td>0.236</td>
</tr>
<tr>
<td>Selenium</td>
<td>-0.148</td>
<td>-0.299</td>
<td>0.003</td>
<td>0.055</td>
</tr>
<tr>
<td>Iodine</td>
<td>27.305(^\ast)</td>
<td>9.170</td>
<td>45.440</td>
<td>0.003</td>
</tr>
</tbody>
</table>

\(^\ast\)lower intakes than control group
\(^\ast\)higher intakes than control group
\(^a\)adjusted for age, gender, energy intake/basal metabolic rate, body mass index, ethnicity, qualification, occupation, living area, supplement use, irregular recording
\(^b\)%Total energy
\(^c\)not adjusted for energy intake/basal metabolic rate
\(^d\)(g)

NSP, non-starch polysaccharides
6.5 Discussion

6.5.1 Review of findings in light of existing literature in food allergy research

This is the first study to investigate the full spectrum of nutrient intake in the food-allergic population including children, teenagers and adults with reactions to a plethora of foods. The results suggest that food allergies, disregarding the types and numbers of food involved, have an independent effect on dietary intakes when adjusted for age, gender, energy intake / basal metabolic rate, body mass index, ethnicity, qualification, supplement use and irregular recording procedures. Multiple regression analysis identified six nutrients including fat, niacin, sodium, calcium, phosphorus and iodine where intakes differed between participants with food allergies and healthy controls. Of these, fat, sodium, calcium, phosphorus and iodine intakes were lower, whereas niacin intakes were higher in the food-allergic group.

Looking at the unadjusted age-subgroup analysis, all of these differences were found in children and teenagers. Lower intakes of protein, vitamin B12, potassium, calcium, phosphorus and iodine in children with food allergies indicate the absence of milk and dairy products in their diet. Lower intakes of protein, calcium, potassium and phosphorus in young children have been previously reported (David et al. 1984, Henriksen et al. 2000, Medeiros et al. 2004, Laitinen et al. 2005). Calcium was also found to be an at-risk nutrient for children with cow’s milk or multiple food allergies in a study conducted in the USA (Christie et al. 2002). However, most food-allergic children in our study still met the age- and gender-specific recommendations for these nutrients despite this absence, apart from iodine which was below RNI in half of the children with food allergies. These results indicate that most of the parents/guardians of children with food allergies were well informed about appropriate alternative sources of these nutrients including dietary supplements. As mentioned before, other studies have highlighted the benefit of nutrition counselling on elimination diets (Tiainen et al. 1995, Christie et al. 2002, Seppo et al. 2005, Flammarion et al. 2011).
In teenagers, differences in nutrient intake between the food-allergic and the control group were confined to fat, carbohydrate, niacin and selenium intake. Higher intake of niacin does not necessarily indicate a particular food group that was predominately consumed as niacin is abundant in many foods (Thomas, Bishop & British Dietetic Association 2007). Dietary intakes of selenium vary greatly since the selenium content of plant foods is determined by the local soil composition from which the food is grown. In the UK, selenium levels in soil tend to be rather low. Selenium is found in high concentrations in brazil nuts, fish and offal, but a wide range of foods contain low concentrations of it (Food Standards Agency 2002b). It is therefore difficult to trace the food sources that could have contributed to the higher selenium intake of teenagers with food allergies. Although energy intake between teenagers with and without food allergies was similar, the percentage of energy from fat was lower among teenagers with food allergies. Lower fat intakes have also previously been reported in young children on a cow’s milk free diet (Henriksen et al. 2000, Medeiros et al. 2004). One reason for this might be that teenagers with food allergies are less likely to consume typical snack foods as they often can only have the foods they bring from home, and hence their snacking behaviour could be very different to teenagers without food allergies.

Adults only showed differences in zinc and folate intake between the food-allergic and non-food-allergic group. Higher intakes in the food-allergic group could be either due to healthier lifestyle or higher supplement use (34.8%) as, similar to teenagers, these nutrients cannot be attributed to a certain food or food group. Adults with food allergies rated higher on a scale measuring how much attention they would pay to healthy eating than those without food allergies (mean scores 3.2 as opposed to 2.6). The only study on dietary intake among adults with food allergies that has been previously performed was in adults with self-reported milk allergies (McGowan & Gibney 1993). There, a number of nutrients including fibre, β-carotene, vitamin C, vitamin E, iron and folic acid were higher in the food-allergic group than in controls. On the contrary, calcium was significantly lower. The authors concluded that their results might reflect a greater interest in food and nutrition of
subjects with food allergies. Similarly, the overall observed lower sodium intake in the entire food-allergic population could be explained by a healthier lifestyle of participants with food allergies. Although assessment of salt intake from food diaries is often very inaccurate as it is difficult to quantify how much salt has been added to the food during cooking or at the table, plus salt content of ready made foods can be highly variable (Thomas et al. 2007), these inaccuracies are expected to be evenly distributed between subjects with food allergies and controls.

In line with the findings from the NDNS, potassium, magnesium, calcium, iodine, selenium, zinc and copper were identified as at-risk nutrients for not only the food-allergic but also the general population. Although values were on average higher in healthy controls of this study, they proportionally correspond to the higher energy intakes compared to those obtained in the NDNS. Often energy intake is used as a proxy for dietary intake. If energy intake is underestimated, it is possible that the intake of other nutrients is also underestimated (Livingstone & Black 2003). Even though the proportion of those failing to meet RNI were very high for some nutrients, it needs to be emphasised that some people might still have adequate nutrient intakes despite not meeting the RNI. Reference nutrient intakes are calculated to cover the needs of at least 97.5% of the population (COMA 1991). Although it is uncertain why energy intake of participants from the NDNS are on average lower than those of healthy controls from this study, one could argue that the rate of overweight and obesity might have accounted for the differences observed. As demonstrated in a study using data from an earlier NDNS survey (Rennie, Coward & Jebb 2007), overweight or obese participants are more likely to under-report their energy intake than lean subjects. In this study, the average rates of overweight and obesity were 17.6 and 7.5%, respectively, which are lower than those reported in the NDNS (pooled estimate for all ages: 20% overweight and 20% obesity) (Bates et al. 2012).

This study assessed nutrient intake from food sources and dietary supplements. The percentage of supplement use in this study (21.2 to 34.8%) was found to be very similar to the NDNS where 22-33% participants reported taking supplements (Sadler et al. 2011). It
is possible that a substantial proportion of participants with, but also without food allergies, would not have met the recommendations without dietary supplement intake. For calcium, it has been shown among teenagers on a cow’s milk free diet that these recommendations cannot be met without large changes in dietary patterns or the use of calcium-fortified foods (Gao, Wilde, Lichtenstein & Tucker 2006). Likewise, children with food allergies who achieved the recommendations for calcium in previous studies were consuming fortified foods or taking dietary supplements (Devlin, Stanton & David 1989, Henriksen et al. 2000, Christie et al. 2002, Flammarion et al. 2011).

6.5.2 Study population

The present study was conducted with samples recruited through various routes. The food-allergic population included mostly subjects that were members of a charity (Anaphylaxis Campaign). It could be argued that charities and support organisations attract individuals with high socio-economic status and more severe forms of food allergies, and therefore they do not represent the entire population. Equally, those participants with food allergies that were recruited through the NHS clinics might suffer from more severe, multiple food allergies than most people with food allergies. Additionally, the majority of them had presumably received specialised dietetic advice. Both members of the charity and participants who were approached via schools were identified as having food allergies through self-report questionnaires and thus, they can only be assumed to be suffering from true food allergies. However, self-report of food allergies was backed up by reported method of diagnosis and symptoms.

The majority of controls that volunteered to take part in the study were recruited through advertisement on the University website, or in the case of children and teenagers via collaborating schools. It is possible that recruiting through advertisement attracted health motivated participants, who might have had a better diet than the general population. Advertising the study on the University website reached a sample with higher socio-economic status, but given that the food-allergic group also had a higher socio-economic backgrounds these two groups were by all means comparable.
The study sample was recruited from Portsmouth, Hampshire, and the Isle of Wight. We can therefore assume that there are no major geographical variations in the diet of food-allergic and non-food-allergic participants. All factors that are considered to be influential on dietary intake were adjusted for in the final analysis, even if no statistical differences in sample characteristics were observed.

### 6.5.3 Methodological issues

Although the food diary was considered as the most appropriate dietary assessment method for this study, its validity should have ideally been assessed prior to its use in order to identify errors in data collecting. However, validation studies are relatively expensive and difficult to perform (Thompson & Subar 2008). Given that this study was part of a PhD project and therefore time and resources were limited, validation with doubly labelled water or urinary nitrogen methods would have gone beyond its scope. Validation with an internal marker of validity such as multiple 24-hour recalls would have posed high demands on participants and good agreement between the two methods might have been caused by similar errors (Trabulsi & Schoeller 2001). In view of these considerations, dietary intake data in this study was collected using only one method. However, energy intake was evaluated using the Goldberg equation to identify under-reporting (Goldberg et al. 1991).

Furthermore, food diaries are prone to error if not properly kept. Participants received comprehensive and detailed instructions on how to use household measures to record intake and were advised to write down what they were eating at the time. It was emphasised that participants should not change their diet during the days of recording and the importance of keeping the diary during school or work days was emphasised. Due to time and personnel constraints, food diaries and questionnaires were sent out by mail and so face-to-face interviews when placing and collecting them were not possible. Data collection therefore merely relied on participants’ willingness to provide accurate data. Even though participants were never personally seen, all food diaries were carefully checked and participants were prompted for missing details over the phone. Additionally, they were offered help with
the recording procedure if needed. Those participants who did not stick to the recording instructions of recording four consecutive days including three weekdays and one weekend day were still included in the study, but the final analysis was adjusted for irregular recording procedure.

For children, parents were requested to keep the food diaries and ask someone else to do it when they were not with their children. Teenagers were encouraged to keep the food diaries themselves with assistance from their parents. It was therefore up to the parents to ensure that their teenage children provided accurate information on what they were eating. It is possible that teenagers felt inhibited by their parents’ supervision and so their food diaries and questionnaire might not reflect actual intake or true statements.

To prevent any bias at the coding stage, data entry was performed by experienced nutritionists and dieticians following a strict protocol based on the FAO INFOODS guidelines for food matching (Stadlmayr et al. 2011). At the end, all food diaries were checked for errors in portion size estimation and food composition table use by the same researcher. If any coding errors occurred during this process, they are likely to be similar between the food-allergic and control group. Some of the specialised food products for food allergies were not available on the food composition tables and were replaced with foods that were thought to be similar. Nonetheless, it is possible that these foods may not reflect the actual foods they consumed. It would have been interesting to calculate intake of essential fatty acids as children with food allergies have been shown to be at risk of developing a deficiency in essential fatty acids (Aldámiz-Echevarría et al. 2008). However, many foods in the food composition tables miss information on fatty acids composition and thus calculated values would not have been accurate.

Similar to identifying participants with food allergies, anthropometric measures were self-reported and not assessed by the researchers. A review of studies comparing direct vs. self-report measures for assessing height and weight has demonstrated that participants tend to under-report weight, whereas height is likely to be over-reported (Gorber, Tremblay,
Moher & Gorber 2007). It therefore cannot be ruled out that requirements for energy intake and rate of misreporting were actually higher than reported in this study.

6.5.4 Analysis

As discussed earlier, one of the main sources of error in dietary assessment studies is misreporting (Poslusna et al. 2009). Under-reporting was also a problem in this study. The Goldberg equation was used to identify under-reporters, a method that takes into account variability of dietary intake, variability in energy expenditure and length of dietary record. However, this method only detects extreme cases of under- or over-reporting (Goldberg et al. 1991, Black 2000a). With it, 20-30% of participants were identified as under-reporters in this study, the majority of them being teenagers or adults. Since their exclusion would have introduced a source of bias into the dataset, and nutrient intake with and without under-reporters differed, it was decided to include all respondents but to control for energy intake/basal metabolic rate in the final analysis.

Statistical analysis examining the impact of food allergies on dietary intake was conducted using MANCOVA and multiple regression. These methods allowed factors that were identified as being influential on dietary intake in the literature to be controlled for (Section 6.4.5.2). Additionally, the influence of factors such as supplement use, under-reporting and irregular recording of dietary intake was evaluated prior to multivariate analysis. Unfortunately, it was not possible to adjust for lifestyle factors including smoking, alcohol consumption and physical activity as this data was only collected in teenagers and adults and analysis was performed on the whole sample. By using MANCOVA and multiple regression analysis, it could nevertheless be demonstrated that some of the differences observed in the unadjusted analysis were not explained by food allergies. The multiple regression analysis demonstrated that supplement use (folate, zinc), age (selenium, zinc, carbohydrate), gender (folate), BMI (zinc), occupation (energy), and living area (folate) accounted for these differences. It would have been interesting to perform these analyses at the subgroup level, but sample sizes of subgroups were too small to obtain valid results.
A sample size calculation resulted in 50 participants in each subgroup and 150 for the whole sample. With 185 participants returning completed food diaries this goal was achieved and analysis on the whole sample can be considered as powerful enough to detect differences between the food-allergic and the control group. On a subgroup level, the required sample size was achieved for teenagers and adults, although there were only 23 adults with food allergies taking part. With a sample size of 34, subgroup analysis on children was underpowered and observed that differences in nutrient intake could have occurred due to chance. In addition, age-specific comparisons between participants with food allergies and healthy controls were performed without adjustment for confounding factors. Although they provide valuable information on differences in nutrient intake among these groups, those differences cannot fully be attributed to food allergies. As a consequence, these results need to be interpreted with caution.

6.5.5 Conclusions and directions for future research

This study is the first one to provide a comprehensive survey of nutrient intake in children, teenagers and adults with food allergies with extensive adjustment for other factors influencing dietary intake. It shows that dietary intake between the food-allergic and the general population is largely similar, but confirms previous investigations into the difficulty of replacing nutrients found in milk with sources other than fortified foods or supplements. Dietary management of food allergies to nuts, eggs, or peanuts is somewhat easier as nutrients in these foods can be derived from many other nutritionally equivalent foods. Children with cow’s milk allergies require special attention and monitoring of their nutritional status. Nutrition education and adequate substitution of alternative nutrient-dense foods is the cornerstone of successful elimination diet management. For management of cow’s milk and/or multiple food allergies, use of dietary supplements might be suggested to ensure appropriate supply of nutrients.

The findings of this research suggest several important avenues for future research. Although the current study provides essential information on dietary intake of the food-allergic population, further dietary issues related to food allergies need to be explored. In
order to be able to better tailor dietary advice to individual food allergies, studies that address the dietary impact of these are required. There is also a need to examine the relationship of the number of foods that have to be avoided as a result of food allergies and the dietary quality. Even though dietary supplements might help in meeting recommendations, it is not established yet under which circumstances they should be recommended. Another research area that warrants further investigation is the influence of elimination diets on essential fatty acids intake, particularly among those with fish allergies. Since vitamin D is not only obtained from the diet but also through synthesis from exposure to sunlight, measures of serum concentrations, which reflect the level of both, would provide more accurate information of supply. Overall, accuracy of dietary intake data would be improved with the use of nutrient biomarkers. Finally, nutrient deficiencies could also affect children, teenagers and adults with non-allergic food hypersensitivity. It is therefore important to assess the effect of those on dietary intake needs as well.
Chapter 7

General discussion of findings from this PhD

7.1 Overview

This chapter discusses the overall findings of this research. It begins with a brief summary of the rationale and principle aims for this research. This is followed by reflection on my personal experience prior to the start of this research, which has shaped and influenced the approach, data collection and interpretation. After that, the findings of each study are summarised within the context of the respective determinant of food choice behaviour as described in the literature review, and theoretical and methodological issues are addressed. Then, the implications for healthcare professionals and policy makers are highlighted and future avenues for research presented. Finally, an overall conclusion of this research is made.

7.2 Summary of the rationale and aims for this research

The rationale for this research was built on the need to explore how the food-allergic population manages their diet, to what extent food allergies would effect the foods they choose and consequently the quality of their diet. It was demonstrated that dietary management can only be understood if the concept of food choice behaviour within the food-allergic population is thoroughly examined. The diversity, dynamic and multidisciplinary nature of food choice behaviour required a critical engagement with different theories and perspectives. This also
included developmental considerations. It was finally argued that food choice behaviour of children, teenagers and adults is best evaluated if analysing the quality of their diet.

The main purpose of this research was therefore to obtain a full understanding of the influences on food choice behaviour within the food-allergic population and to evaluate their dietary quality. Taking developmental considerations and theoretical perspectives into account, these principle aims were further specified as the following objectives:

- To explore the attitudes, behaviours, beliefs and experiences influencing the food choice behaviour of adults with food allergy.
- To explore the attitudes, behaviours, beliefs and experiences influencing the food choice behaviour of teenagers with food allergy.
- To test a novel approach to determine the impact of food allergy on mother-child interaction during a collaborative problem-solving activity in a food-related context.
- To assess and evaluate the dietary intake of macro- and micronutrients of children, teenagers, and adults with food allergy.

### 7.3 Reflexivity of my personal experience

As outlined in Section 3.4.2, reflexivity is believed to enhance the credibility of research findings. Reflexive accounting on how the researcher’s background and experience have shaped data collection and interpretation is important in terms of personal and intellectual biases (Mays & Pope 2000). The reflexivity of my personal experience and background is given below:

I am a young female in my early thirties who relocated from Austria to England to study for this PhD. My background is nutrition and public health. I have not worked as a healthcare professional in a clinical setting. Although I am a native German speaker, I have achieved fluency in English and can read, speak, listen and communicate effectively. My age might have closed the gap to the younger participants and helped them to open up
and talk about their beliefs and experiences, but could have created the opposite effect on older participants. I tried to use age-appropriate language and made efforts to get the tone of the information sheets, topic guide and the interview right. Despite all my endeavours, it is still possible that my language and cultural background prevented me from completely connecting with the participants, although I did not have the feeling that this was the case.

Before each focus group, interview and observation, I allowed enough time to get to know the participants and their parents. In that time, I could address any concerns and reassure the participants and parents that the research was conducted in a professional manner. I also used that time to explain to them the context of the research and put them into the right mood for the session. Data collection took place in the home or a neutral environment so that participants felt comfortable and safe. Additionally, I dressed in a smart but casual manner to avoid any feeling of intimidation whilst demonstrating the importance of the research. In terms of perception on health awareness and food choice behaviour, I highlighted at the beginning of each interview or focus group that the participants would not be judged on their eating habits, and that there was no ‘right’ or ‘wrong’ answer to a question. They were also informed that I was not a healthcare professional so that they would not feel intimidated. In terms of the observational study with children, I remained in the room during the activity to ensure that both mother and child were involved with the task and to assist if needed. It cannot be ruled out, that some of the mother-child pairs found this situation intimidating or felt observed affecting the way they communicated with each other.

It is also worth mentioning that I do not suffer from any food allergy myself and that I had not had any personal involvement with food allergy at the time of data collection and analysis. Additionally, my perception on food allergies and food choice behaviour is shaped by a different cultural background. However, I have gathered knowledge by intensively reading around the areas and through discussing issues with healthcare professionals and other researchers. Gaining this knowledge was important for me in order to be able to conduct and analyse the study, but I was careful not to share my knowledge with the participants. The fact that I have not had a pre-existing opinion or experience about how
food allergy might affect food choice behaviour was hopefully beneficial for the data collection and analysis in a sense that I was entirely open to the outcome of the research.

7.4 Main findings of this research in discussion with existing literature

This main findings of this research are presented in relation to the two principle aims of this research. To start with, findings from the first three studies are jointly discussed within the context of the respective determinant of food choice behaviour as described in the literature review. Then, the results of the dietary assessment study are critically examined.

7.4.1 Food choice behaviour

From the three studies addressing food choice behaviour, or with mother-child interaction around food at least a key aspect of food choice, several important issues attributed to the influence of food allergies on food choice behaviour emerged. At the same time, it became obvious that the food-allergic population is very similar to the general population with regard to many other determinants of food choice behaviour.

7.4.1.1 Biological and psychological determinants

As expected, food allergies did not have an effect on biological influences on food choice behaviour such as hunger or satiety apart from being a biological influence, i.e. an immunological disorder, itself. Nevertheless, food allergies were mentioned as the main reason for choosing food among adults, consciously accompanying and informing many food choice decisions. Among food-allergic teenagers, while many also conceded that food allergies played a major role in their food choices, some of them downplayed its importance, and engaged in risk taking behaviours involving infrequent label reading, consuming ‘may contain’ products, or not asking for ingredients in restaurants; all behaviours that have been described many times before (Akeson et al. 2007, DunnGalvin et al. 2009, Gowlan 2002, MacKenzie et al. 2010, Marklund et al. 2007, Monks et al. 2010, Muñoz-Furlong 2003, Sampson et al. 2006). Food allergies were also an issue when mother and child were
choosing food as part of the game in the case study, although it did not appear to be the most salient determinant for the child. It therefore seems that food allergies are mostly affecting conscious food choice decisions in adults.

Further, it can be hypothesised that those participants who had been diagnosed with food allergies from an early age have never acquired certain taste preferences and therefore also do not have the feeling of missing out on foods they were not allowed to eat. This would explain why many teenagers stated that they did not have a desire to consume the foods they were allergic to, often because they would taste “horrible”. Exceptions were favourite foods that suddenly had to be avoided. Similarly, Zac, the child from the case study presented within Chapter 5, reacted to foods he could not eat with disgust and dislike “oh, I hate eggs”. In contrast, many adults with food allergies reported a lack of pleasure or satisfaction from food which would impact on the whole experience of eating. During the course of the focus group discussion, it turned out that this was mainly true for those adults who had been diagnosed with food allergies later in life. Within food choice behaviour literature, the phenomenon of getting immediate experience or anticipation of pleasure from the orosensory stimulation of eating a food is commonly referred to as ‘palatability’, ‘hedonic value’ or ‘liking’ of foods (Mela 2000, 2006). Normally children’s food choices are often guided by their preferences (Pérez-Rodrigo, Ribas, Serra-Majem & Aranceta 2003), and this is also reflected in the results obtained from the teenager study. However, adults with newly diagnosed food allergies can find themselves in a similar situation to children in that they have to learn new food preferences, particularly if food groups have to be avoided (e.g. milk, wheat). This issue is not well-known within food allergy literature aside from the finding that teenagers with food allergies would often miss their favourite food (MacKenzie et al. 2010, Marklund et al. 2007).

Closely linked to acquisition of food preferences is food variety seeking. Food variety seeking has been shown to be a stable behaviour throughout childhood (Skinner et al. 2002) that is tracked into adulthood (Nicklaus et al. 2005). Findings from both the adult and teenager studies indicate that food allergies can be a barrier to this behaviour. In adults, food
variety seeking was predominately considered as a consequence of being bored with foods and lacking pleasure, whereby some found it more difficult to eat a varied diet than others. Teenagers, on the other hand, considered varying their food choices and palate to be part of growing up, maybe because they see this behaviour in their parents who act as social role models in the dietary development process (Ritchie et al. 2005). Although not all teenagers would feel confident in trying new foods, this issue was more prevalent in those with food allergies as they have to be very cautious when trying new foods, especially outside their home, as has also been reported by DunnGalvin et al. (2009), MacKenzie et al. (2010), Marklund et al. (2007), Monks et al. (2010). In some, this would even lead to a fear of new foods, a so-called neophobia (Scaglioni et al. 2008), which has been described in young children with food allergies (Fortunato & Scheimann 2008) and in 5-14 year old children who have outgrown their food allergies (Rigal et al. 2005). Food allergies can again be a formidable barrier to maintaining a varied diet necessary to support adequate growth and health. Therefore, it is important not to place unnecessarily high dietary restrictions on children with food allergies, although this seems to be a common practice among parents because they fear their child experiencing a reaction (Ng et al. 2011). Establishing a positive relationship with food might be more difficult or challenging for children with food allergies, but it has been shown in this study of children that it can be achieved.

Although it could be assumed that food allergies trigger certain emotions in relation to food and eating, this was not confirmed in these studies. Emotional influences on food choices demonstrated high inter-person variability and different ways by which emotions can affect eating habits were reported both by adults and teenagers. There were only some food-allergic adults who described difficulties in finding foods they could treat themselves with as they often had to miss out on chocolate and cakes.

7.4.1.2 Social determinants

One of the most striking findings from this investigation is that food allergies have a strong impact on social relationships around food. Eating is important in building connections and reinforcing social ties between individuals (Debevec & Tivadar 2006). This was also
recognised by non-food-allergic adults and teenagers in this study, although teenagers did not emphasise it as much as adults. However, adults with food allergies in particular reported to have considerable difficulties joining social food gatherings, not only amongst a wider circle of people but also with the immediate family. This supports previous research where food-allergic adults rated their social activities on quality of life scales lower than the general population (Flokstra-de Blok et al. 2010, Primeau et al. 2000). Food-allergic teenagers mainly feared the social embarrassment of having attention drawn to their allergy in front of people. Consequently, they only felt comfortable when eating with people they were familiar with such as family and close friends. The feeling of being different to peers is commonly viewed as negative and undesirable among teenagers with food allergies (DunnGalvin et al. 2009, Marklund et al. 2007, Akeson et al. 2007). This is also reflected in their wish to consume similar foods as their friends as reported by the teenagers in this study. In contrast, adults with food allergies did not think that their eating habits would be influenced by other people. This most likely refers to the conscious food choice decisions since experiments have shown that people tend to eat bigger meals and larger amounts of food when they are with other people (De Castro 1990). Teenagers with food allergies also contrasted with adults in that they did not believe that their food allergies hindered them from going to parties where food was provided. This conflicts with a large body of literature that reported a negative impact of food allergies on social activities of children and teenagers (DunnGalvin et al. 2009, Flokstra-de Blok et al. 2010, MacKenzie et al. 2010), particularly from the parent’s perspective (Bollinger et al. 2006, Mandell et al. 2005, Ostblom et al. 2008, Valentine & Knibb 2011). Under these circumstances food choices could to a great deal be influenced by the fear and anxiety of a reaction by parents or those providing the food.

Although peers become increasingly influential on food choices as children become older (Contento et al. 2006), parents play the most important role in the development of children’s and teenager’s food choice behaviour, shaping them from a very early stage (Ritchie et al. 2005, Scaglioni et al. 2008). The relationship between parent and child is therefore crucial with respect to adult eating patterns (Kelder et al. 1994), and parenting style and practices are hotly debated (Ritchie et al. 2005, Savage et al. 2007,
Ventura & Birch 2008, Scaglioni et al. 2008, Powell et al. 2011). Although only a pilot study, results from the observations on mother-child interactions do not indicate that the mother’s style of communication or parenting is influenced by a child’s food allergies (Table 5.2). Moreover, parenting styles varied greatly within both mother-child dyads of food-allergic and non-food-allergic children (Table 5.6), which suggests that other factors predicting parenting style including maternal age, marital status, education level, number of children living at home and family socio-economic characteristics (Fox et al. 1995) are more powerful than food allergies alone. At the same time, however, mothers of children with food allergies tended to employ more directives when playing the game than those of children without (Tables 5.4 and 5.5), which is in line with findings from a previous study where high levels of parental anxiety was associated with high levels of reported use of parental control behaviours and child anxiety (Ackermann 2008). Several maternal behaviours of responsiveness and affect were associated with child engagement behaviours such as cooperation, joint attention and affect (Table 5.3) which is in line with general developmental literature suggesting that children’s cooperation, an important aspect in both food allergy management and development of eating habits, is predicted by mutually shared positive affect and by a positive maternal communication style (Kochanska & Aksan 1995).

However, individual analysis of mother-child dyads showed that where mothers used an authoritative parenting style, a mix of responsiveness, warmth, and demandingness, children were generally highly engaged with the game (Table 5.6). Taking the case study, where this can be exactly observed, it is suggested that a child with multiple food allergies is able to establish a positive relationship with food, despite its restricted diet. The child did not display signs of any behavioural disturbances in relation to food, for example anxiety from food and eating as has been reported by Avery et al. (2003). The assumption that an authoritative parenting style is most predictive for effective child’s behaviour is echoed in general developmental (Grusec 2011), food choice behaviour, e.g. Patrick et al. (2005b), and diabetes literature, e.g. Davis et al. (2001).

Parental control declines as children get older, and once reaching adolescence, they increasingly take more autonomy for their food choices (Hill 2002, Bassett et al. 2008a).
The teenagers of this study thought that their parents had a lot of control over their food choices, mainly because they would make food available in the house and select the evening meal. Whilst they tried to gain more influence in the foods their parents would shop and cook, the prospect of having an evening meal was considered as convenient and something to look forward to. Food availability is indeed one important factor by which parents exercise control over their children’s eating habits (Ritchie et al. 2005, Patrick & Nicklas 2005a). Bassett et al. (2008a) reported that parents of teenagers would predominately use the home environment to exercise control over their food choices by providing foods they wished them to eat. This strategy allowed the teenagers to make own food choices under a controlled setting, thus avoiding many conflicts. Teenagers with food allergies did not necessarily seek to take over the responsibility for their food choices from their parents in the same way as their healthy peers, rather the opposite; their parents’ control provided them security. Older teenagers expressed concern over moving away from home, which coincides with what parents of teenagers reported in a study by Akeson et al. (2007). Food allergy literature suggests that teenagers generally struggle with parental hypervigilance (DunnGalvin et al. 2009, Herbert & Dahlquist 2008) and parents themselves think that they overprotect their child (Gupta et al. 2008). However, the findings from this study indicate that in terms of food choices, this overprotection is appreciated by the teenagers. It seems that teenagers with food allergies seek more protection and control for food than their healthy peers, but in others aspects of life they have similar parental expectations and demands.

7.4.1.3 Cultural determinants

In terms of cultural ideals, teenagers with food allergies did not differ to those without food allergies in this study. Body image and healthy eating were equally important or unimportant to them, showing that these ideals were hardly influenced by the chronic condition. The concern with body image and the concomitant dieting trends is predominately affecting girls, although also some boys diet in order to improve their physical appearance (Lau & Alsaker 2001). Even though the majority of the boys showed an understanding of the importance of a healthy diet, it was outweighed by the preference for snacks, sweets and fast foods.
This reflects the general opinion among teenagers (Stevenson et al. 2007), which could be explained by the fact that teenagers do not want to be seen as being interested in healthy eating by their friends as it conveys a social and symbolic meaning that conflicts with their values (Stead et al. 2011). Teenagers with food allergies did not demonstrate enhanced health awareness as consequence of their condition, they rather thought their allergy would make them automatically eat healthier, which is what has previously been reported by families of food-allergic children (Valentine & Knibb 2011). Among adults, following a healthy diet was generally perceived as important, with many of them aiming to achieve a ‘healthy balance’ for which they had different interpretations. Participants in a study by Paisley et al. (2001) also refer to ‘healthy balance’ as a guiding principle in food choice decisions. Those with food allergies varied in their interest in healthy eating, but clearly prioritised their food allergies over it. A few thought that it was difficult to eat a healthy diet because of the allergy, others believed their allergy made them more aware of what they were eating, and some again did not see a link between the two. It is therefore possible that a diagnosis of food allergies can change your perception of health and healthy eating, despite the fact that other factors including high socio-economic status and wealth are certainly stronger predictors of healthy eating habits (Shelton 2005). Other cultural ideals such as ethical considerations were more important to the non-food-allergic population, both adults and teenagers, probably because those with food allergies do not want to place any further restrictions onto their diet or finding food that is safe for them to eat captures all their attention. Research shows that, despite principally supporting ethical issues around food, many people would not put them into practice as other factors such as price would take over (Weatherell et al. 2003). General cultural influences such as meal traditions, routine, and concepts of meals were also reported but they were not affected by food allergies.

7.4.1.4 Economic determinants

Economic influences such as price were mainly a point of discussion among the adults, although teenagers also pointed out that food had to be good value for money if they spent money on it for themselves. In fact, people rate cost as the second most important consideration for choosing food after taste (Glanz et al. 1998). In this study, adults consistently
regarded price to an important factor of their food choices, but those with food allergies were divided on whether their condition would impact on total grocery costs or not. Those who felt it did believed that higher expenses were a result of the necessity to buy free from products and fresh ingredients instead of ready meals. This is in line with a previous study by Voordouw et al. (2009) looking at food-allergic participants from the Netherlands who thought they spent less money on grocery costs as a consequence of omitting many food products, whereas those from Greece reckoned they spent more money on food to avoid allergens and increase variety. Since cultural differences cannot explain the differences in cost perceptions in this study, it seems more logical that people’s income accounted for them. Streptoe & Pollard (1995) have demonstrated that price is a particularly big issue among people with low-incomes.

Another economic issue that predominately mattered to adults was organising food and meals. Eating requires time and effort, and people perceive available time in different ways, depending on their demands such as employment, roles, gender and income (Jabs & Devine 2006). Although traditional meals are still seen as the ideal way of eating, convenience products are staple foods in many households in the UK (Carrigan et al. 2006). Teenagers from this and previous studies (Neumark-Sztainer et al. 1999) stated that convenience is a major influence in their food choices. Food preparation and organisation affects everyone, but adults with food allergies highlighted that careful planning of food shopping and meals was essential, and was therefore experienced as burdensome rather than enjoyable. Additionally, they missed spontaneity in their eating habits and described their shopping habits as unexciting and steady. Bisogni et al. (2005) conceptualises the knowledge and ability to organise, cook and prepare meals as ‘food management skills’, and it is possible that individuals with food allergies require advanced skills and knowledge. This is also important in terms of developing an eating routine, which is, according to Marshall (2006) what constitutes daily eating, even though it is an internalised behaviour, often not obvious to the individual. The non-food-allergic adults in this study also mentioned that their eating habits followed a certain routine, particularly during the week.
7.4.1.5 Environmental determinants

Of the environmental factors, food availability and media were identified as influences on food choice. Eating takes place in a context and food availability changes with the location. Habits were reported by the participants to differ between home, school, work, restaurants or other food places, and also when travelling to other countries. While eating out and experiencing new food was generally seen by non-food-allergic adults and teenagers as a nice alternative to what is normally consumed at home and as an opportunity to choose what they wanted to eat, those with food allergies reported that they faced many challenges and obstacles when eating out and travelling. Whilst highlighting that they still enjoyed eating out and travelling, food-allergic teenagers mentioned that they had to be very careful in terms of undeclared ingredients and cross-contamination in restaurants, and would often rely on their parents to deal with the situation or stick to familiar foods. Adults with food allergies reported difficulties such as incorrect information provided by restaurant personnel, the feeling of not being understood or taken seriously by them, and language barriers when travelling abroad. Their experiences conform to those reported in the literature (Leftwich et al. 2011). Teenagers with food allergies noted that in these situations the decision over food choices was in someone else’s hands.

Familiarity was not only a key strategy for selecting food in restaurants but also for food shopping. Adults and teenagers with food allergies were consistently of the opinion that food labels made food products less, rather than more accessible. This issue has been recently investigated (Cornelisse-Vermaat et al. 2008, Voordouw et al. 2009, Barnett et al. 2011a,b), and results from recent studies propose the need to harmonise current labelling practices including standardisation of format and traceability of ingredients.

Television viewing also appeared to be an influential tool not only on teenagers’ but also adults’ eating habits. Both mentioned that food adverts on TV would often stimulate an immediate desire to consume these foods or make them aware of new products they would purchase in the future, which is in line with what has been reported in the literature (Fiates et al. 2008, Harris et al. 2009). This topic was less prevalent among the food-allergic
population, suggesting that they, particularly adults, are less susceptible to environmental cues about food and eating. Probably for a similar reason, food-allergic adults were less influenced by weather and seasonal changes than non-food-allergic adults.

7.4.2 Dietary intake

The findings from the food choice behaviour studies indicated some behavioural differences between the food-allergic and the general population, particularly among adults, and it was therefore expected to observe differences among their actual food consumption based on macro- and micronutrient intake. Indeed, the results from this dietary survey suggest that food allergies, disregarding the type and number of foods involved, has an independent effect on dietary intakes. More specifically, intakes of fat, niacin, sodium, calcium, phosphorus and iodine differed between the food-allergic and the general population when analysis was adjusted for confounding variables including age, gender, energy intake / basal metabolic rate, body mass index, ethnicity, qualification, supplement use and irregular food diary recording procedures. Of these, fat, sodium, calcium, phosphorus and iodine intakes were lower, whereas niacin intakes were higher in the food-allergic group (Table 6.10). This study was the first one to investigate dietary intake in children, teenagers and adults with predominately multiple food allergies (Table 6.1) in the age range 4-65 years.

Unadjusted age-subgroup analysis revealed that these differences were found in children and teenagers. In children, those with food allergies had lower intakes of protein, vitamin B12, potassium, calcium, phosphorus and iodine than those without (Table 6.4), which indicated the absence of milk and dairy products in their diet. This affected 27.8% of food-allergic children. Similar at-risk nutrients have been identified in other studies on children following a milk-free diet (David et al. 1984, Henriksen et al. 2000, Medeiros et al. 2004, Laitinen et al. 2005), and calcium alone has been found to be critical in children with cow’s milk or multiple food allergies (Christie et al. 2002). In teenagers, carbohydrate, niacin and selenium intake was higher and fat intake lower among food-allergic participants (Table 6.5). Higher intakes of niacin and selenium are both difficult to interpret as niacin is abundant in many foods (Thomas et al. 2007) and the selenium content of plants varies
greatly depending on the local soil (Food Standards Agency 2002a). In terms of fat and carbohydrate intake, it is possible that food-allergic teenagers consume less snack foods compared to non-food-allergic teenagers as they often can only have the foods they bring from home so their snacking behaviour could be very different to teenagers without food allergies. Since only 14% of teenagers were suffering from cow’s milk allergies in this study, it seems unlikely that low fat intakes were associated with elimination of milk. Adults only showed differences in zinc and folate intake, both of them higher in the food-allergic group (Table 6.6). This could be explained by either a healthier lifestyle (mean scores 3.2 as opposed to 2.6 on scale measuring attention paid to healthy eating) or a higher supplement use (34.8%) of food-allergic adults. Increased health awareness among individuals with food allergies has also been the conclusion of (McGowan & Gibney 1993), who studied adults with self-reported milk allergy and found higher intakes of fibre, β-carotene, vitamin C, vitamin E, iron and folic acid in the food-allergic than in the control group, while calcium was significantly lower. Furthermore, this was in line with the overall observed lower sodium intake in the entire food-allergic population in this study (Tables 6.3, 6.10).

Despite these differences between the age groups observed, potassium, magnesium, calcium, iodine, selenium, zinc and copper were identified as at-risk nutrients for both populations (Table 6.8). This is in line with the findings from the NDNS (Bates et al. 2012), and although values were on average higher in healthy controls of this study, they proportionally correspond to the higher energy intakes compared to those obtained in the NDNS (Table 6.7). Interestingly, it was mainly teenagers and adults failing to meet the age- and gender-specific recommendations and not children, where even those with food allergies achieved recommended intakes for most nutrients. It can therefore be concluded that dietary quality deteriorates with age, independent from the allergic condition, and that teenagers are the age group that need special attention. Children with food allergies in this study appeared to be well-looked after, maybe because their parents had received appropriate dietary advice. The benefit of nutrition counselling on elimination diets has been highlighted in other studies (Tiainen et al. 1995, Christie et al. 2002, Seppo et al. 2005, Flammarion et al. 2011).
It is further worth mentioning that nutrients assessed in this study did not only come from food sources but also dietary supplements. In fact, 21.2 to 34.8% of participants reported taking supplements, which is very similar to the results from the NDNS (22-33%) (Sadler et al. 2011). Consequently it can assumed that a substantial proportion of the participants would not have met the dietary recommendations without these. As for children and teenagers with food allergies, previous studies suggest that recommendations for calcium intake are difficult to achieve without taking a supplement, consuming fortified foods or large changes in dietary patterns (Gao et al. 2006, Devlin et al. 1989, Henriksen et al. 2000, Christie et al. 2002, Flammarion et al. 2011). In McGowan & Gibney (1993)’s study, adults did not even achieve calcium recommendations despite the use of supplements. Although the contribution of supplement use to nutrient intake was not assessed in this study, it seems that under some circumstances, for example children with cow’s milk allergies or individuals with multiple allergies, supplement use might be needed.

7.5 Study population

This research was conducted in the UK, and therefore the food choice behaviour of this study population is embedded within this society and culture. Additionally, their diet could be different to other populations and there might be more alternative food products for individuals with an allergy available than in other countries. However, I would argue that many findings from this research are applicable to Western countries.

The aim of all studies was to recruit a sample population showing a wide variation of socio-demographic and food allergy characteristics, reflecting the food-allergic and the general population. This was achieved for most socio-demographic characteristics such as gender distribution, age, ethnicity, employment and qualification although there were slight variations in some studies. In the adult study, the control group had more women and more participants with higher qualifications than the food-allergic group. Non-food-allergic teenagers were on average older than food-allergic teenagers in the teenager study. And in the child study, socio-demographic differences between the two groups were observed for ethnicity and education, having more White and higher educated parents in the non-food-
allergic group. For all studies, more non-food-allergic than food-allergic participants were recruited, which is simply because they were easier to recruit and sample sizes were in practice difficult to match. However, since these were qualitative studies or in case of the children a correlational study with a qualitative factor, sample sizes cannot be interpreted and determined in the same way as quantitative studies. A central aspect in terms of sample selection, according to Lincoln & Guba (1985), is that it is stopped when no new information is forthcoming and data saturation has been achieved. Even though the groups differed in numbers and were relatively small, a wide range of opinions and views were shared by participants. Their information was analysed based on their diversity and not their frequency of occurrence, and thus, slightly different numbers among the groups did not have a major effect on the findings.

What certainly influenced the results of this research was that all of these studies, including the dietary assessment study, predominately included White participants, which does not reflect the multi-ethnic British Society or their food choices. As has been earlier discussed, culture has a major influence on food choice decisions (Mela 1999, Devine et al. 1999, Rozin 2006). Ethnic differences played a particular role in the child study, where three out of five children of the food-allergic group had ethnicities other than White. Since parenting styles have been shown to be influenced by the cultural background of the mother (Hughes et al. 2005, Cardel et al. 2012), it is possible that the higher degree of directiveness among mothers of children with food allergies as compared to mothers of non-food-allergic children was due to their different ethnic background and not the food allergies (Table 5.4).

Another characteristic that might have affected the results of the study is gender. Previous research has shown that women usually attach greater importance to healthy eating and they are more likely to diet for weight control purposes (Wardle et al. 2004). Parents also use different practices for girls than for boys when trying to get them to eat (Orrell-Valente et al. 2007). Additionally, gender differences are also an issue within food allergy research, especially with respect to health-related quality of life (Marklund et al. 2007), and the need to integrate a gender dimension into food allergy research has been emphasised (Dun-
nGalvin et al. 2006). Gender imbalance in favour of women was predominately observed for adults and teenagers in the dietary assessment study, but as analysis was adjusted for gender, it should not have impacted the final results. However, in order to be able to make gender-specific recommendations in terms of dietary management of food allergies, it is important to address gender issues in future studies.

Similarly, these studies recruited higher educated participants than the average British population. Based on an OECD report using data from 2003, the percentage of the population that has attained higher education qualification corresponds to 28% in the UK (Machin & McNally 2007). In this research, the proportion of higher educated participants reached up to 88% in the adult study (Table 3.1), but was normally around 40-55% in the other studies. In general, the distribution between the food-allergic and the control groups was rather equal, apart from the child study where none of the mothers of the children with food allergies were higher educated, whereas 57% of those having children without food allergies had at least a University degree (Table 5.1). Not only ethnicity, but also socio-economic characteristics have been shown to predict parenting style and practices around eating (Fox et al. 1995, Orrell-Valente et al. 2007, Cardel et al. 2012). High socio-economic status is also a determinant for healthy eating habits (Inglis, Ball & Crawford 2005), and it therefore seems likely that the entire study population of this research displayed a healthier food choice behaviour and food consumption than the average British population.

In addition to influences on mother-child interaction and parenting style that were assessed in this study, other factors could have contributed to the findings. For example, the age of the children was measured in years and not in months, which can be a rather crude measure at that developmental stage, not only in terms of the child’s cognitive development, but also the mother’s involvement in the activity. If age was more accurately assessed, it would have been easier to judge maternal and child behaviour. Other important characteristics which could have impacted on parenting style or mother-child interaction included maternal age, marital status and number of children living at home (Fox et al. 1995). Similarly, maternal controlling behaviours could be influenced by maternal BMI,
body dissatisfaction and child’s weight. Parents with a higher BMI and higher level of body dissatisfaction might be more likely to be preoccupied with their own weight, which could make them try to control their child’s weight and eating with restrictive practices. They may also increase their level of control behaviours if their child is overweight as a result of significant concern about their child’s health status (Gray et al. 2010).

Also within the food-allergic population alone, several characteristics could have had an influence on the results of these studies. First, food allergy characteristics such as perceived severity of food allergies and time of diagnosis most likely contributed to how participants felt their allergy would influence their food choice decisions as well as how mother and child communicated during the activity. As mentioned by Mandell et al. (2005), diagnosis with food allergies will often follow a period of psychosocial adjustment and the results from the adult study indicate that a diagnosis received during adulthood sometimes leads to a new exposure of unfamiliar tastes. Second, most of the participants in this research suffered from multiple allergies and probably also more severe allergies than the general food-allergic population. Those enrolled in the studies had to have a diagnosis of true food allergies and therefore the results cannot be extrapolated to the entire food hypersensitivity population. I also conducted focus groups with self-reported food hypersensitive people as part of the adult study, but since this population was not within the scope of this research, their findings are presented elsewhere (Sommer et al. 2012) (Appendix 0.1). Even though participants were carefully screened for proof of true allergic condition (method of diagnosis, symptoms), it cannot be completely ruled out that some of them did suffer from true food allergies.

Most issues relating to socio-economic and food allergy characteristics listed here stem from the recruitment procedure applied to these studies. In general, children and teenagers without food allergies were recruited through schools, advertisement on the University of Portsmouth website, and also teenagers through the FAIR study, a previous research project on the Isle of Wight (Venter et al. 2006, Pereira et al. 2005). Non-food-allergic adults were solely approached through advertisements on the University website. This ‘self-selected’ route of recruitment has attracted health-conscious, predominantly
female participants with higher socio-economic status, which as discussed above might have had an influence on their food choice behaviour and consumption patterns. Food-allergic participants were mainly selected through a local hospital and support charity, and therefore might represent more severe cases of food-allergic individuals who had presumably received specialised dietetic advice.

And finally, a few considerations in terms of sample sizes should be made. The adults and teenagers within the two qualitative studies conducted shared a wide range of views, experiences and beliefs in relation to how they were choosing food and, although these findings cannot be generalised on a statistical basis, they provide an in-depth understanding of food choice behaviour in the food-allergic population. Some individuals of the two populations might disagree with some findings in these studies, but the concepts, categories and explanations as provided by this study are likely to remain similar. The sample size of the children in the pilot study was intentionally kept small since the results mainly serve as a base for further studies. As with focus groups and interviews, observational research designs require in-depth analysis that is labour-intensive and time-consuming, so sample sizes are already very small (Wilson et al. 2008). For the dietary assessment study, a sample size calculation prior to the start of the study was performed (50 participants in each subgroup). With 185 participants returning complete food diaries this goal was achieved for analysis of the whole sample. However, I struggled to get enough children to take part in the study, and thus with a sample size of 34, the subgroup analysis on children was underpowered and observed differences in nutrient intake could have occurred due to chance. As a consequence, these results need to be interpreted with caution.

To sum up, despite a few flaws in the recruitment process which have led to the uneven distribution of some socio-economic characteristics as well as the dominance of White, health-orientated and mostly female participants, the findings gained through this research are indicative of a number of factors that impact on food choice behaviour as well as the dietary implications of food allergies.
7.6 Methodological issues

This research employed a mixed method approach using focus group discussions, interviews, observations and food diaries to address the questions of food choice behaviour and dietary intake among the food-allergic population. One of the strengths of a mixed method approach lies ‘in answering a broader and more complete range of research questions because the researcher is not confined to a single method or approach’ (Johnson & Onwuegbuzie 2004: p. 21). It is what Greene, Caracelli & Graham (1989) calls expansion, in which the researcher mixes methods ‘to extend the scope, breadth, and range of inquiry by using different methods for different inquiry components’ (p. 269). Expansion captures the justification or reason for combining various methods in this research best. A further methodological approach that was applied to all studies, even the qualitative ones, is the comparison of data obtained from the food-allergic population to that of the general population. The idea behind this was that contrasting the two groups would help identifying many issues and aspects of food choice behaviour that are influenced by food allergies. In the following, the methodological issues which arose in the individual studies are discussed.

Qualitative research methods have penetrated traditional research areas such as health sciences where they are increasingly being used to provide an understanding of the patients’ needs (Pope & Mays 1995). Similarly, they have achieved recognition in nutrition behaviour research for exploring nutrition and food-related phenomena in relation to human behaviour and behaviour change (Harris et al. 2009). The use of a qualitative approach helped gain an understanding of the food allergy individual’s perspective which is central for developing long-term strategies for management of the condition (Gallagher et al. 2009). The main purpose of a focus group was to collect a wide range of opinions and views whilst highlighting differences in the perspectives of individuals (Finch & Lewis 2003), which was accomplished in both the adult and teenager study. However, despite all focus groups going well in terms of conversation flow and richness of data obtained, it is possible that some participants felt intimidated discussing certain issues such as health awareness in a group setting or thought they had to agree with the leading
opinion. This could have been an issue between older and younger participants. In general though, the group dynamic and atmosphere was perceived as positive and I did not have to work hard to steer the conversation. Since participants who volunteered to take part in the focus group discussion were most likely interested in the topic itself, they found it relatively easy to speak about food and food choices. Only food-allergic participants sometimes swayed off the topic and discussed issues related to food allergies other than food.

Among the teenagers, focus group discussion turned out to be more difficult to conduct. Although the one focus group that was conducted with non-food-allergic teenagers at a local school was successful in terms of data obtained, it was notable that particularly age but also gender differences played a major role during the discussion. I had the impression that younger teenagers were reluctant to contribute to a discussion with older participants. Krueger & Casey (2000) proposes an age range in a group that is not more than two years, which would have been sensible in this study. However, there were also other practical difficulties such as getting food-allergic teenagers from different schools and areas in one place at a time when all of them were available. Additionally, children and teenagers are more likely to participate if they can come with a friend or familiar person (Heary & Hennessy 2002), which could have been a problem for those with food allergies. For these reasons I decided to change focus groups to individual in-depth interviews, but keep the data from the focus group discussion and integrated it into the later analysis.

Qualitative interviewing is the most widely used data collection methods in qualitative research (Silverman 2000). In-depth interviews differ to focus groups in their level of detail and depth, and they allow a personal understanding of the issues explored (Lewis 2003). Since getting teenagers to talk within a group setting was one of the difficulties experienced in the focus group discussion, I hoped that they would open up more during the in-depth interviews, which they did. Both methods have been used in combination in food choice behaviour research before (Bauer et al. 2004), albeit that they generate different types of data. To ensure consistency between the two methods, the in-depth interviews were semi-structured and topics from the focus group protocol were adopted so that data
was obtained at a similar depth to that produced in the focus group. Fortunately, in-depth interviews proved to be the more suitable method with teenagers, as I was able to engage with them on a more personal level, adjusting each interview to their individual needs and personality. Thereby, many of them received a feeling of security and confidence in sharing information. There were only two teenagers with food allergies that felt more comfortable giving the interview in the presence of their mother. This wish was of course respected, and although the data from their interviews might be slightly different to the rest, they were included for completeness in the analysis.

Both focus groups and interviews were evaluated on the basis of representativeness and interpretation of data to ensure rigour. Evaluation criteria included transferability, generalisation, multiple coding, credibility and reflexivity. Transferability, which is the application of the findings to other contexts, was achieved in these studies by purposely recruiting participants with a variety of sample characteristics, thereby covering a range of opinions and views (Malterud 2001). Polit & Beck (2010) describe generalisation as ‘an act of reasoning that involves drawing broad conclusions from particular instances - that is, making an inference about the unobserved based on the observed’ (p. 1451). In order to ensure generalisation, the research findings were embedded within the context of food choice behaviour literature, making it possible to abstract concepts from the data. To confirm reliability of the data, ‘multiple coding’ where an independent rater analyses a section of the data (Barbour 2001) was used. ‘Credibility’, the criterion to evaluate trustworthiness of research (Lincoln & Guba 1985), was achieved by participants checking the study findings and verifying the accuracy of transcripts. The latter was only performed on the teenager study. Finally, as presented earlier, reflexivity of my personal role within this research (Mays & Pope 2000) is another criterion by which rigour in this study was ensured. By embracing criteria that are responsive both to my qualitative ideals and health science research (Mays & Pope 2000), the rigour of the qualitative research carried out as part of this research was assessed. Thereby its valuable contribution in addressing the aims of this research was justified and strengthened.
Several considerations were decisive in the change of approach for the child study as compared to the studies investigating food choice behaviour in adults and teenagers. Although qualitative research techniques could have been employed to explore the experiences, beliefs, attitudes and behaviours of food choice behaviour in children (Nelson & Quintana 2005), it has been shown that young children up to the age of seven display “pre-operational thought”, and thus lack the ability to use causal reasoning in relation to food and eating experiences (Contento 1981). Likewise, this research could have been conducted using parents as a proxy for their children as has been done in some studies assessing the quality of life in children with food allergies (Sicherer et al. 2001, Marklund et al. 2006). However, parental perceptions on certain issues can differ to those of their children (van der Velde et al. 2011) and consequently they do not provide the same information. Since food choice decisions in younger children are co-constructed between parents and children, at least in some situations, an approach that does not rely on self-report and addresses interactional patterns and structures between the two partners was sought.

Thus, a novel approach within food allergy research was tested in children. Using a board game requiring engagement of mother and child, their communication and interaction style during the food selection and classification processes were observed. Observations have a long-standing tradition within developmental research, being used to understand children’s behaviour by getting insight into their feelings and actions (Irwin & Bushnell 1980). They have also become popular for studying parent-child interaction around food choices, also in an experimental setting (Drucker, Hammer, Agras & Bryson 1999, Snoek 2009), and have been found to be particularly suitable for children who cannot verbally report on their perceptions of their parents’ behaviours (Snoek 2009). Thus, even though no conclusions about the mechanisms underlying the observed behaviours can be made (Chisholm et al. 2012), the validity of this approach is widely supported. The board game used in this study has been developed by Chisholm et al. (2011, 2012) to study mother-child communication in children with type 1 diabetes, but had never been applied to the context of food allergies before. Consequently, the aim of this part of the research was to examine its applicability in a pilot study. In fact, the findings from this study are echoed in developmental, food choice
behaviour, and clinical literature (Grusec 2011, Patrick et al. 2005b, Davis et al. 2001), corroborating its validity.

However, several methodological aspects of this method warrant attention. First, it transpired that mother and child need to be clearly informed about their roles during the task if it should resemble a real situation. Some mothers appeared to be less involved, believing that the focus of the research would be on the child’s cognitive skills only. Although not the purpose of this project, the board game would have the potential for investigating collaborative food choice decision-making between mothers and children with food allergies, as has been done with non-food-allergic children and their parents (Snoek 2009, Lynch 2010). Further, the game cannot only be used to examine mother-child interaction, but also to test nutritional knowledge or cognitive skills of children with food allergies. These are demanded in the second part of the game, and interestingly, many mothers changed their interaction style in the second part of the game. This observation finds support in Costanzo & Woody (1985), who suggest that parenting is situation- or domain-specific. Hence, some mothers could provide better support during the food classification than the food selection process. The main analysis of this study was conducted using qualitative rating scales that summarise behaviours over the entire interaction process, so if, for example, one mother was more supportive during the first than the second part of the activity, she received a rating that averaged both performances. Since these rating scales are particularly prone to observer bias, it is important to ensure inter-observer reliability (Aspland & Gardner 2003). This was dealt with by involving two other independent raters and comparing scores for all videos. Another aspect of experimental observational studies is observer presence during data collection. Observer presence could have had an influence on mainly the maternal behaviour and structure as younger children are least likely to be affected by an observer (Aspland & Gardner 2003). Similarly, experimental observations always raise the question of representativeness (Gardner 2000). In other words, it is important to consider if the behaviours observed are similar to those that the mother and child normally display. To minimise the occurrence of observer bias and enhance generalisability, data was mostly collected at the participants’ home, an environment children are familiar and comfortable
with, and I tried to remain in the background when filming the activity.

Finally, methodological considerations for the dietary assessment study have to be made. Following careful deliberation, the food diary was chosen as dietary assessment method for this study. Still an imperfect method, it allowed flexibility in terms of level of food description and the different age population studied, while representing habitual dietary intake. One drawback of this study is that the validity of the NDNS food diary had not been previously assessed, and due to the time and monetary constraints, conducting and testing it was not possible as part of this research. Ideally, this method would have been validated with an external marker such as biomarkers, as the usefulness of validating with an internal marker such as multiple 24-hour recalls is questioned (Trabulsi & Schoeller 2001). However, to provide some evidence of validity, energy intake was evaluated using the Goldberg equation to identify under-reporting (Goldberg et al. 1991).

One of the main sources of error in dietary assessment studies is misreporting (Poslusna et al. 2009). Thus intense efforts to convey accurate recording procedures were made. These included giving comprehensive and detailed instructions on how to use household measures to record intake and emphasising immediate recording after consumption as well as keeping a normal dietary routine. For practical reasons, telephone interviews were conducted with participants to review the diary instead of face-to-face interviews where a more thorough check of the food diaries would have been possible. Hence, food diaries obtained were merely relying on participants’ willingness to provide accurate information. In addition, to eliminate the influence of irregular recording procedures, it was added as a confounding variable to the regression analysis. Specific attention in terms of recording had to be given to children and teenagers. While recording the dietary intake of children was predominately in their parents’ hands, teenagers were asked to keep the food diary themselves. There is evidence that teenagers are prone to provide less accurate reports of their nutritional intake as underestimation of energy intake has been found in a number of research studies (Bandini, Schoeller, Cyr & Dietz 1990, Livingstone, Prentice, Coward, Strain, Black, Davies, ... & Whitehead 1992, Bratteby, Sandhagen, Fan, Enghardt & Samuelson 1998, Bandini, Must,
Cyr, Anderson, Spadanom & Dietz 2003), particularly among girls (Bandini et al. 2003).

Under-reporting was also not only a problem in teenagers but also in adults in this study (Table 6.2). Although under-reporters were identified with the Goldberg equation, this method has been shown to only detect extreme cases of under- or over-reporting (Goldberg et al. 1991, Black 2000a). Since their exclusion would have introduced a source of bias into the dataset, similar to irregular recording procedures (Table 6.9), under-reporters were not excluded but adjusted for in the final analysis.

Furthermore, bias could also have occurred at the coding stage because of incorrect or inconsistency in data entry among the three analysts involved. This was prevented by following a strict protocol based on the FAO INFOODS guidelines for food matching (Stadlmayr et al. 2011) and by checking all food diaries for errors in portion size estimation and food composition table. Another source of bias was the self-reported measurements of height and weight. A recent review has shown that weight is often under-reported while height is likely to be over-reported (Gorber et al. 2007). Therefore, requirements for energy intake and rate of misreporting were potentially higher than reported in this study. Despite all these errors that might have occurred during data collection and analysis, they are likely to be similar between the food-allergic and control group. Finally, it should be noted that because all age groups were collapsed for regression analysis, important influencing factors of dietary intake including smoking, alcohol consumption and physical activity could not be adjusted for. Unfortunately, subgroup analysis could only be performed without adjustment for confounding factors, which makes them less valid than the regression analysis and thus, they should be interpreted with caution.

7.7 Theoretical considerations

Theoretical considerations mostly refer to the studies on food choice behaviour of adults and teenagers with food allergies, but also to some degree to the child study. As discussed in the literature review, this research is underpinned by multidisciplinary models that have combined the two main approaches to study food choice behaviour - social psychological
(theory of planned behaviour and social cognitive theory) and social ecological theories. It was further argued that developmental considerations need to be taken into account when choosing an approach or theory. Thus, different models to study adults and teenagers, and a different approach to investigate food choice behaviour in children was applied. Similarly as with the findings of the study, the thoughts presented here only concern populations in Western countries.

The principal consideration that guided this research was that children, teenagers and adults with food allergies were sought to be studied within a theoretical framework of normative food choice behaviour. For this reason, all studies included a comparative non-food-allergic population and the theoretical models chosen were those that had primarily been developed based on data or literature from the general population. With this approach, the perspective of food choice behaviour being affected by food allergies rather than food allergies being a driver of food choice decisions was taken.

The two models applied in the adult and teenager study differed not only in their perspective, but also the way they have been generated. The food choice process model has been inductively developed and evolved over the years using qualitative investigations (Falk et al. 1996, Furst et al. 1996, Connors et al. 2001, Sobal & Bisogni 2009). It offers a comprehensive representation of the food selection process by integrating major components and multiple determinants of food choice. One of its major strengths is that it views the food choice process as reflective and conscious as well as habitual and automatic. However, even though this model gives a full and complex representation of food choice behaviour, it is not suitable in its entirety as a theoretical framework for small scale studies. Thus, for the purpose of the adult study, the component ‘influences’ were chosen to guide the generation, analysis and interpretation of the data. Since the aim of this study was to identify attitudes, behaviours, beliefs and experiences that influence food choice behaviour, rather than to reproduce how food choice decisions in particular situations are made, this component appeared most useful in this context. Furst et al. (1996) identified five categories of influences on food choice decisions: cultural ideals, personal factors, resources, social factors and
present contexts. Of these, personal factors and social factors are most represented in the findings. Personal factors include physiological and psychological factors (*I just feel like eating, Foods, and the whole experience of eating can be pleasurable*) as well as social roles which were not identified in the analysis. Diseases or illnesses (e.g. food allergy) can also be classified as personal factor (*When it comes to food, my health is an important (if not the most important) consideration*). Social factors, which refer to the relationships that constrain or facilitate food choice decisions, were incorporated into two themes - *My cultural background influences my food choices* and *Foods, and the whole experience of eating can be pleasurable*. The other categories, cultural ideals, resources and contexts, are also reflected in the findings, but the themes underpinned by those were not of foremost importance to the adults in this study. The focus for future studies among adults should therefore be on the mental processes and social relationships involved in their food choice decisions.

The conceptual framework for adolescent food choice behaviour has been deductively developed by reviewing and conceptualising the literature (Story et al. 2002). This model has a stronger ecological perspective than the food choice behaviour model, hence it also kept the structure of four levels of influences. Compared to the food choice process model, this theoretical framework lacks depth, detail and specificity, particularly in terms of the mental processes involved in food choice decisions and the description of factors influencing these. It puts more emphasis on environmental aspects of dietary behaviour and how proximate or distant they are to food choice behaviour of children or teenagers. This criticism can be confirmed in the adolescent study. Despite all four levels of influence (individual, social environmental, physical environmental and societal) being represented in the results, it is noticeable, similarly to the findings from the adult study, that individual and social influences, resonating the social cognitive part of the model, were more predominant in teenagers’ food choice behaviour. Individual influences, which include psychosocial, biological and lifestyle factors are reflected in six out of seven themes *Variety and enjoyment of foods as learning process* and *Body awareness, feeling, and temptation of foods*, and partly in *Routine, tradition, and environment*, *Parental control v.s. convenience* and *Knowledge*.
shapes understanding of foods and social environment influences, which demonstrate the impact of parents, family, friends and peer networks on teenage food choices, supported the themes *Variety and enjoyment of foods as learning process*, *Body awareness, feeling, and temptation of foods*, *Parental control v.s. convenience* and *Eating as social experience*. Although also physical environmental and societal influences played a role in the discussion, they appeared to be less obvious to the teenagers, most likely because these influences are more distant to them and often happen on a subconscious level. The criticism that this model fails to address the interaction between the different levels of influences does not find support in this study. In most cases more than one influence fed into a theme, which indicates a strong interrelation of these influences. However, the direction and importance of these interrelations are not emphasised in this model.

In sum, while food allergies had some effect on physical environmental influences, for example that food-allergic participants appeared to be less influenced by the media than non-food-allergic participants, the determinants of food choice behaviour that seemed most affected by food allergies were personal and social influences. Here again, social influences seemed to be more dominant during childhood and adolescence whereby later in life personal or cognitive influences take over. This provides important knowledge for future studies, and it is suggested for them to focus on personal and social determinants of food choice behaviour. Additionally, the food choice model opens new avenues of research such as investigating food choice behaviour of individuals with allergy from a life course perspective but also examining how food choice values are redefined and renegotiated after a diagnosis of food allergies.

### 7.8 Implications for practice and future directions for research

As discussed in the literature review and throughout the individual chapters, successful dietary management is central for the dietary quality of children, teenagers and adults with food allergies (Carvalho et al. 2001, Fox et al. 2004, Christie et al. 2002, Flammarion et al.
Previous literature has shown that food-allergic consumers experience difficulties when eating out (Leftwich et al. 2011) and while shopping (Cornelisse-Vermaat et al. 2008, Voordouw et al. 2009), and that their quality of life, particularly in the domain of social well-being, is affected in all age groups (Cummings et al. 2010a, for review). It further highlights developmental issues with respect to food allergies (DunnGalvin et al. 2009) and food choice behaviour. Overall, the findings from this research suggest that, despite many similarities, the food-allergic population differs to the general populations mainly in terms of personal and social factors affecting food choice behaviour. Moreover, the findings propose that dietary quality is predominately compromised in children with cow’s milk allergies, since replacing nutrients found in milk with sources other than fortified foods or supplements is difficult. These findings have several important implications for clinical practice and future research.

The key message from this research is that healthcare professionals and dieticians should offer patients with food allergies advice that goes beyond avoidance of foods. Main efforts within dietary management should focus on dietary variety and enjoyment aspects of eating as well as the importance of social relationships that are built around food. The personal and environmental circumstances such as monetary constraints could play a major role in managing food allergies and thus, they should be considered when giving dietary advice. A central issue is to get routine into the diet of adults with food allergies, and this is why recently diagnosed patients need specific attention and education in appropriate avoidance of allergenic foods and alternative foods that can be consumed. This should also include education for individuals with food allergies relating to the practice of organising and planning meals. This research further emphasises the importance of increasing food variety from an early age so that children and teenagers with food allergies overcome their caution of new foods and learn to enjoy food and eating. Although eating out always involves an extra risk of a reaction, food-allergic teenagers should still be encouraged to go to restaurants and food places in order to get them used to these situations and to build up confidence in communicating their dietary needs. What seems very important to teenagers is that they are able live a similar life to their peers, and this is also true for the food they share.
Equally, adults should not stay away from social events that involve food. With children, parents should be encouraged to help their child establish a positive relationship with food. Supported by evidence from developmental and food choice behaviour literature, mothers who display an authoritative parenting style by employing a mix of responsiveness, warmth and demandingness, but not in a controlling manner, have children with the highest level of engagement and healthiest food consumption patterns (Grusec 2011, Patrick et al. 2005b). Such a relationship could lay the foundation for a positive approach of the food-allergic child towards food by granting the children autonomy and support instead of overprotection and control in relation to their food choices and also food allergy management. As demonstrated in the dietary assessment study, nutrition education and adequate substitution of alternative nutrient-dense foods is the cornerstone of successful elimination diet management. For management of cow's milk and/or multiple food allergies, use of dietary supplements might be indicated to ensure appropriate supply of nutrients. At the same time, the dietary intake should be constantly monitored, particularly in children when there is concern that the recommended nutrient intake cannot be achieved. However, in most cases, individuals struggle to meet the recommendations because of other reasons than their food allergies.

Future directions for research studies include a more in-depth investigation of the areas highlighted in this research project. This would, for example, involve examining the impact of specific food allergies on food choice behaviour and dietary intake as well as developmental aspects, gender, socio-economic status and ethnicity of individuals with food allergies that need to be considered when studying eating habits and food consumption. In adults with recently diagnosed food allergies, of particular interest would be to look at food choice behaviour from a life-course perspective, thereby enabling assessment of what changes in food choice behaviour a diagnosis brings about. In both adults and teenagers with food allergies, cognitive processes underlying food choice decisions as described in the personal food system of the food choice process model could be investigated. Research with self-reported food hypersensitivity in adults (Sommer et al. 2012) indicates that their dietary behaviour is different to the population studied, which could be similar among teenagers or children. Moreover, they could also show nutrient deficiencies.
Since the child study was a pilot project, it raised many questions for future research. By increasing the sample size, it would be possible to confirm whether parenting styles are indeed highly variable with mothers of children with food allergies and whether they are more likely to use control behaviour when their child is choosing food than those of non-food-allergic children. From the child’s perspective, it would be interesting to know whether a food allergy makes them more insecure and cautious in approaching food and whether they seek more support from their mother during food selection than those without food allergies. Although this research only enrolled mothers and their children, it is not said that the same investigations could not be conducted with fathers and their food-allergic children. Indeed, fathers use different strategies to control children’s eating behaviours than mothers (Orrell-Valente et al. 2007). In terms of the novel method that has been used, it has the potential to answer other research questions such as collaborative food choice decision-making between mothers and children with food allergies or testing nutritional knowledge of children with food allergies. Parent-child play does also have the potential for use in a clinical setting as a behavioural assessment tool in clinical practice (Brestan-Knight & Salamone 2011). Future avenues for research could include assessing the role of dietary supplements in helping meet the nutrient recommendations, and establishing under which circumstances these should be recommended. This would require a detailed examination of the type and number of foods to be avoided and their impact on dietary intake. Furthermore, the influence of elimination diets on essential fatty acids intake, particularly among those with fish allergies, could be investigated. Another particular nutrient of interest would be vitamin D, which is not only obtained from the diet but also through synthesis from exposure to sunlight, and thus measures of serum concentrations would provide more accurate information of supply. Overall, accuracy of dietary intake data would be improved with the use of nutrient biomarkers. Finally, even though this research applied a multi-strategy approach using several methods, the information obtained would be strengthened by linking the different methods. For example, food choice behaviour could be combined with food consumption patterns of the same individual, and the data from the mother-child observation could be used in conjunction with interviews, food diaries, questionnaires and biomarkers.
On a larger scale, a longitudinal approach would provide repeated information about food, eating and nutrition issues among the food-allergic population over time.

7.9 Conclusion

Food choice is a complex human behaviour determined by a combination of biological, psychological, social, cultural and economic factors (Shepherd 2005). It is a dynamic, flexible concept that is changed or modified throughout the life-course, developing from early childhood up until old age (Sobal & Bisogni 2009). A chronic condition that requires the elimination of certain food from the diet, such as food allergies, has a natural impact on an individual’s food choices and dietary intake.

This research has generated new knowledge that helps healthcare professionals and policy makers improve the dietary management of children, teenagers and adults with food allergies. The first study of this research has provided a description of the factors influencing food choice behaviour among adults with food allergies. Previous research has predominately focused on the challenges that food-allergic consumers face, for example when eating out or while shopping, but no studies have ever addressed the effect of food allergies on the full complexity of food choice behaviour. Similarly, the second study of this research deals with determinants of food choice behaviour among teenagers with food allergies. Although this age group has been more intensively studied than adults, existing literature mainly covers experiences and quality of life issues of teenagers with food allergies. Often, the parent’s viewpoint has been presented. This was also the reason why a novel approach in the form of a board game has been tested in the third study of this research, which sought to determine the impact of food allergies on mother-child interaction in a food-related activity. The final and fourth study of this research has evaluated the dietary quality of children, teenagers and adults with food allergies. There has been a paucity of studies assessing dietary intake in food-allergic individuals aged four years and older.

The main strength of this research was the use of a mixed-method approach. The concepts of food choice behaviour and dietary intake have a strong and bidirectional relationship and
the use of a combination of research approaches and methods have contributed to exploring the breadth and range of these. This mixed method approach has further been improved by including a comparative aged-matched control population in each study, thereby enabling the identification of aspects of food choice behaviour and dietary intake attributable to food allergies only. Another strength of this research is that it presented influences on food choice behaviour from the respective age group’s viewpoint. This has been achieved by applying research methods suitable for the developmental stage of each group. For the youngest age group, a novel innovative method within food allergy research has been introduced.

The most important finding of this research is that food allergies mostly affect food choice behaviour in adults, probably because personal, cognitive factors play a more dominant role during food choice decisions than during childhood, where social influences are more prevalent. Although they appeared least affected by the allergic condition, children have been shown to be the age group making most nutritional compromises. It is recommended that dietary management of food allergies should place more emphasis on dietary variety and the enjoyment aspects of eating as well as the importance of social relationships that are built around food. Additionally, regular evaluations of dietary intake, particular in children with cow’s milk allergies or individuals with multiple food allergies, should be conducted.

This research has provided a cross-sectional survey of food choice behaviour and dietary intake among children, teenagers and adults with many implications for practice and future research. In both food choice behaviour and dietary intake research, several aspects affecting individual food allergies and population groups remain to be investigated. Similarly, the use of the novel method applied in the child study needs to be tested for research and clinical practice. The ultimate aim within research on dietary management of food allergies would be a longitudinal approach including repeated information about food choice behaviour and dietary intake.
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Factors influencing food choices of food-allergic consumers: findings from focus groups

I. Sommer, H. MacKenzie, C. Venter & T. Dean

BRIEF COMMUNICATION

Abstract

Background: Up to 35% of the population modify their diet for adverse reactions to food. This study described the food choice behaviour of diagnosed food-allergic (DFA), self-reported food-allergic or intolerant (SFA) and nonfood-allergic (NFA) consumers, and explored differences between them.

Methods: Six focus groups with adults (n = 44) were conducted. Data analysis was performed using thematic content analysis.

Results: Compared to NFA participants, DFA consumers were deprived of satisfaction and pleasure from foods, experienced difficulties finding safe foods and had to be organized with eating. SFA participants faced similar problems, but to a lesser degree; their food choices were strongly influenced by emotional factors or health awareness.

Conclusion: Food-allergic consumers’ food choices are influenced by a number of factors that differ to those of NFA consumers. It is therefore important to offer people with food allergies or intolerances advice that goes beyond how to avoid allergens.

Food choice is determined by a complex combination of factors ranging from biological to social and cultural (1), and affects the acquisition, preparation or consumption of food (2).

Food allergy affects approximately 3–4% of adults in westernized countries (3). However, the prevalence of self-reported food allergy is substantially higher (<35%) (3). Currently, avoiding the offending food is the mainstay of treatment (4). Although there is some evidence of the impact of food allergy on anxiety and quality of life (5, 6), little is known about the extent to which food allergies determine food choice decisions.

This study describes the complexity of food choices made by food-allergic as opposed to nonfood-allergic (NFA) consumers using a qualitative approach.

Methods

This study included three samples: diagnosed food-allergic (DFA), self-reported food-allergic or intolerant (SFA) and NFA adults. Potential participants with diagnosed food allergies to egg, milk, peanuts, tree nuts, sesame, crustaceans, fish or wheat were recruited through a local hospital and support charity (The Anaphylaxis Campaign). Only those with evidence of a positive skin prick test, serum-specific IgE results or a positive food challenge were included. Nonfood-allergic and SFA participants were recruited through advertisement. The Southampton and South West Hampshire NHS Research Ethics Committee (A) approved this research project.

Data were collected using focus group discussions (FGDs), held in a meeting room of a local restaurant/community centre and lasting 1–2 h. A topic guide informed by previous examples (7) was prepared to elicit the discussion (Table 1). Focus group discussions were audio-taped and transcribed verbatim for analysis, using Braun and Clarke’s criteria for thematic content analysis (8). It was aided by NVivo 8 software (QSR International Pty Ltd, Doncaster, Victoria, Australia). Participants’ statements were coded and collated into subthemes, then grouped into common themes and elements.

Results

Forty-four adults (12 DFA, 15 SFA and 17 NFA) participated in six FGDs, two in each group. Sample characteristics are outlined in Table 2.

The analysis generated three main elements and seven themes:

Why do I eat?

Theme 1: ‘I just feel like eating’

A number of participants across all groups reported a link between eating habits and feelings. Particularly, SFA group
stated that they used foods to console themselves during periods of emotional stress. Ironically, comfort foods seemed to be those they suspected of causing reactions (Box 1A).

Conversely, some DFA group described difficulties finding foods they could treat themselves with.

Table 1 Topic guide for focus groups (online repository)

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<tr>
<th>Topic guide for focus groups (online repository)</th>
<th>Food choices of food-allergic consumers</th>
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<tr>
<td>1. You should all have completed a worksheet when you arrived today. Would you like to tell us what you have eaten the previous day? Prompts: Can anybody share with us why he or she chose those foods and not others? What factors influenced the food choice? Are some factors influencing the food choice particularly strong? Does this change from time to time? In which situations does the reason you eat change? Has anybody different eating habits at the weekends? 2. When it comes to food preparation, does anyone want to share with us what he or she considers? Prompts: Do you prefer to prepare your meals or eat out? What is the difference between a meal and a snack? 3. Personal circumstances or special occasions often do not allow us to have a meal at home. Can anybody tell us about his or her eating out habits? Prompts: How often? What places? How does anybody decide where to go when he or she wants to go out? What about fast foods? If so, why? 4. Eating is sometimes considered to have a great social impact. What do you think influences you when eating with others? Prompts: Food and eating in the family? How often does the family eat together? What meals are family meals and when do they occur? Why or why not? How important is food and eating in the family? Eating with friends? Who in the family prepares the food? Who chooses what the family will eat? 5. Sometimes what we eat is influenced by our feelings. Can anybody share their experiences of how their mood has influenced their eating habits? Prompts: How? What foods are eaten when someone feels good? What foods are eaten when someone feels bad? How are snacks influenced by moods? 6. Let’s turn to food purchasing. Would anyone share with us how he or she is doing the food shopping? Prompts: How often? How does anybody decide what to buy? Where? 7. A number of people try to follow a healthy diet. Would you like to tell us if or how important it is for you to eat healthy foods? Prompts: Are there any foods that do and do not go together? Are there any things that are bad to eat? What foods are good to eat? What are the advantages and disadvantages of eating a healthy diet? What are the barriers to eating a healthy diet? 8. Your diet might change when travelling to different countries. Would you like to tell us about your experiences? Prompts: What is different when going abroad? Do you like trying new foods? Do other cultures have an influence on your eating habits? Are there difficulties when going abroad? 9. (Only for groups with food-allergic or intolerant participants) You are here because you have a food allergy. Would anyone like to share with us what difficulties you have when it comes to buying and eating food? Prompts: Do you read food labels? How often? If not, why? Has anybody experiences of eating food that might have contained some allergen? If so, why? What was the most difficult adjustment that was made because of your food allergy? Are there any barriers when eating out in restaurants? If yes, which?</td>
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Table 2 Characteristics of participants

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<td>Crustaceans</td>
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<td>Sesame</td>
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<tr>
<td>Others*</td>
<td>7</td>
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<td>Avoidance</td>
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<td>Single foods</td>
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<tr>
<td>Multiple foods</td>
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*Others included fruits, lentils, onions, chilli, cream, oil, sugar, coffee, celery, cucumber, Chinese food, strawberry, wine, yeast, soya, gluten, monosodium glutamate, salicylates, barley, oats.

Box 1 Quotations from participants

A ‘I find when I am comfort eating I am, I don’t know what it is, I seem to go for the foods that I know I get into that downward spiral in, and getting out of that can be very difficult, cause it’s not just how your body is reaction, reacting, it’s the mental, emotional with it as well...’ (DFA)

B ‘I don’t think you enjoy your food as much as you did before you had your allergies...like you say lunch, you have a sandwich or you have your fruit, and now you have got bits of cardboard and very plain boring, so it’s not something you look forward to.’ (DFA)

C ‘...you don’t go to Christmas parties because you can eat nothing on the menu. So you just make an excuse and can’t go there.’ (DFA)
How eating makes me feel

**Theme 2: ‘Food, and the whole experience of eating, can be pleasurable’**

Eating, and the whole experience surrounding food, was considered a source of pleasure for most participants. Among SFA participants, some would abstain from so many foods that they felt the enjoyment aspect of eating was lost. A number of DFA participants shared this opinion, especially those diagnosed as an adult (Box 1B). However, others thought that the deprivation of some foods had opened their mind to a whole range of new foods.

Sharing meals or eating with others was regarded as the most pleasant way of consuming foods. Generally, DFA group felt that they would experience many difficulties when eating with other people (Box 1C).

How do I choose what to eat?

**Theme 3: ‘Eat what you can afford’**

Price was considered a big issue when choosing food with the emphasis on buying foods you can afford. Some felt that their food allergy did impact on their shopping bills (Box 1D).

**Theme 4: ‘Eating requires organization’**

Participants from all groups agreed that preparing and eating food requires time and effort. While planning food shopping and meals was perceived as useful by many NFA, the majority of SFA and DFA participants experienced it as burdensome. In addition, their allergy or intolerance would limit their selection of foods in supermarkets, so sticking to familiar foods was easier, and for DFA participants also safer (Box 1E).

**Theme 5: ‘When it comes to food, my health is an important consideration’**

Most participants from all groups considered a healthy diet important, although the SFA participants were the most health-conscious group. Among DFA participants, some believed their allergy increased their awareness of what they were eating, whereas others felt it was hard to get sufficient nutrients from their diet (Box 1F).

For DFA group, their food allergy remained their biggest concern when choosing food. A similar behaviour was observed within SFA groups, with the distinct difference that some SFA participants would occasionally consume the food they were avoiding.

Food labels only played a significant role for DFA. Although food labels are intended to ease the food selection process, it was often the opposite (Box 1G).

Members from both SFA and DFA groups sometimes experienced difficulties in finding foods that were safe to eat, mostly when eating out or travelling.

**Theme 6: ‘My cultural and social environment influences my food choices’**

Participants from all groups observed that their food choices are impacted by their environment, including other people and the media.

**Theme 7: ‘Foods have a place and time’**

There was a general agreement across all groups that eating habits would differ depending on the location (Box 1H) and time of the day.

Discussion

This is the first study to investigate the influence of food allergy on individuals’ food choices. With this knowledge, gaps in this research area as recently reviewed (9) are addressed.

Interestingly, DFA group did not differ from NFA group in their motivations for eating, whereas SFA group did. Many of the SFA group observed a strong emotional link with their desire for eating. This phenomenon has never been reported before, but could indicate a potential psychological involvement with self-reported food allergy. On the other hand, DFA group reported a lack of pleasure from food, most notably those who had been diagnosed later in life.

Many DFA participants reported their food allergy compromised their social life, which is echoed in previous studies (5, 6).

In line with a previous study (10), DFA participants were divided on whether their food allergy would impact their total grocery costs or not. These results highlight that dietary advice should be given in the light of monetary constraints if present.

In terms of shopping habits, some DFA participants perceived food selection in supermarkets to be limited, and...
sticking to familiar foods/brands was one strategy to reduce the risk of reactions. This has also been reported in a recent study on nut-allergic consumers (11).

A number of participants across the groups showed increased awareness about healthy eating habits, with SFA group being the most concerned. This link has been described before (12). Among DFA participants, their allergy had clear priority over other health issues. Finding safe foods was often a challenge, in particular when eating out and during travelling. Their experiences conform to those reported in the literature (13).

Diagnosed food-allergic participants consistently expressed dissatisfaction with current food labelling practice. The risk of accidental exposures because of inappropriate food labelling is well known (14), and food-allergic consumers’ experiences with food labels have been comprehensively investigated (10, 11).

This study addresses a long neglected gap in a rarely studied age group within food allergy, and by using a qualitative approach, motivations for choosing food could be identified. Another strength of this study was its comparative design. By contrasting food-allergic or intolerant consumers to their nonallergic ‘controls’, issues that concern only these groups could be highlighted. This research further emphasizes the need to clearly distinguish between DFA and SFA in health care and future investigations.

In terms of limitations, DFA groups were selected through a local hospital and support charity, and they might be better informed about avoidance strategies than other DFA. Also, advertisement may have attracted health-conscious, predominantly female participants with higher qualifications. Notwithstanding, the findings are indicative of a number of factors that impact food choices in the study population.

The results from this study emphasize the importance of offering patients with food allergies or intolerances advice that goes beyond avoidance of foods by also considering personal and environmental circumstances.

Authors contributions

All authors have contributed to the design and preparation of the manuscript. IS was the principal investigator and conducted data collection, analysis and writing of the first draft of the manuscript. HM participated in data collection and analysis. CV provided allergy dietetic expertise and assisted with data collection. TD established the initial scientific questions and provided continuing intellectual guidance.

Funding

This project was funded through a studentship award by the University of Portsmouth.

Conflicts of interests

CV has provided education material for Danone and Mead Johnson and is a research fellow of the National Institute of Health Research. All other authors have declared no conflict of interests.

References

Appendix 3.1 - An investigation into food choice behaviour of children, teenagers and adults with food allergies: letter of ethical approval

National Research Ethics Service
SOUTHAMPTON & SOUTH WEST HAMPSHIRE
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CM/eta
13 May 2010
Ms Isolde Sommer
SHSSW, James Watson West
2 King Richard 1st Road
Portsmouth
PO1 2FR

Dear Ms Sommer

Study Title: An investigation of food choice behaviour of food allergic and non-food allergic consumers
REC reference number: 10/H0502/26
Protocol number: 1

Thank you for your letter of 28 April 2010, responding to the Committee’s request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Vice-Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see “Conditions of the favourable opinion” below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research (“R&D approval”) should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk. Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority. The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England.
Appendix 3.1 - An investigation into food choice behaviour of children, teenagers and adults with food allergies: letter of ethical approval

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

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<td>Investigator CV: Professor T Dean</td>
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<td>Investigator CV: Ms I Sommer</td>
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<td>Participant Information Sheet: Teenagers</td>
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<td>Letter of Invitations - Teenagers</td>
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<td>Letter of Invitations - Parents (12-15 years old)</td>
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This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority.

The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England.
Appendix 3.1 - An investigation into food choice behaviour of children, teenagers and adults with food allergies: letter of ethical approval

Focus Group Topic - Teenagers
Response to Request for Further Information
Participant Consent Form: Parental

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/H0502/26 Please quote this number on all correspondence

Yours sincerely

Dr Chris Markham
Chair

Email: scsha.SWHRECA@nhs.net

Enclosures: "After ethical review – guidance for researchers" SL- AR2

Copy to: Ms Denise Teasdale, University of Portsmouth

This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority. The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England.
Appendix 1.2

An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic adults

Information sheet

You are invited to take part in a research study, which I am conducting. Before you decide whether you would like to participate, it is essential for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully and discuss it with friends and relatives if you wish. Please ask me if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

The purpose of the study is to find out what attitudes, behaviour, beliefs and experiences influence the food choices of allergic consumers’ and suspected-allergic consumers and how these differ to non-allergic consumers.

Why have I been chosen?

You have been chosen because you either have been diagnosed with a food allergy OR you are likely to have a food allergy, but have not been diagnosed yet OR you do not suffer from any food allergy at all. You are therefore valuable to help me answer the research question.

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to take part I would like to suggest that you keep this information sheet. I will also ask you to complete and sign the enclosed consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.
Appendix 1.2

How is the study conducted?

This study is a qualitative study. This means that I need to collect as much information as possible about what attitudes, behaviour, beliefs and experiences influence the food choice of allergic, suspected-allergic, and non-allergic adults. The more you are able to share with me the more accurate a picture I can develop about the food choice behaviour of these groups.

What will happen if I decide to take part?

If you decide to take part in the study I would like to invite you to join a focus group, which is really an informal group discussion. The focus group will have up to 9 other adults with a food allergy (or not), an assistant and myself. The group is going to be held at a place and time that is convenient to the participants. The focus group will be very informal and refreshments will be available. The refreshments will only include foods participants are not allergic to. Participants will receive a £10 gift voucher to thank them for their time. The group will be conducted as a relaxed discussion, with very little participation from myself, other than to introduce a few ideas for discussion. I anticipate that it will last between 1-1½ hours. I would like to tape record the group discussions. These recordings will then be typed word-by-word and analysed.

What are the benefits of taking part?

You would not personally benefit from participating in the study. However, I hope that this study will lead to a better understanding on what influences the dietary pattern of food allergic, suspected-food allergic, and non-food allergic adults.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks to you in taking part in this study, although it will involve giving up a couple of hours of your time.

Will my taking part in the study be kept confidential?

Yes. All information collected during the course of the research will be kept strictly confidential. You will not be identified by name in any reports or publications resulting from this study.

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results will therefore be published in suitable clinical journals, entered on electronic web-based databases and presented orally at conferences, to individuals and organizations which have an interest in them. I will also summarise my findings in a brief report to all participants.

Who is organising and funding the research?
The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. People within the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight are involved in the study.

Who has reviewed the study?

The study has been reviewed by the Southampton and South West Hampshire Research Ethics Committee A.

What should I do next?

If you are interested in joining the study please sign the enclosed consent form and complete the enclosed questionnaire. Please then return these to me in the enclosed envelope. I will then contact you to offer you a date to come to one of the groups. To help me do this and if you are happy to, could you please also write your phone number on the consent form.

Alternatively, you could ring me to discuss coming to one of the groups, if I am not in when you ring please leave a message and your number and I will contact you as soon as possible. Finally, should you decide to join the study, I would like to inconvenience you as little as possible, so it would also help if you could write on the consent form or let me know if you would prefer to join a daytime or evening group. Please, write your preferences on the back of your consent form. I may not be able to match everyone’s preference, but I will try and get close to it. Please do also prepare the enclosed sheet on what you have eaten the day before and bring it along.

If you have any questions at all then please do not hesitate to contact me and I will be happy to speak to you. Thank you for your time.

Isolde Sommer
PhD Student
Appendix 3.3 - Consent form adults: food choice behaviour study

Appendix 1.3

Study Number:
Patient Identification Number for this study:

CONSENT FORM

Title of Project: An investigation of food choice behaviour of food-allergic, suspected-food allergic, and non-food allergic adults

Name of Researcher: Miss Isolde Sommer

Please initial box

1. I confirm that I have read and understand the information sheet dated ......................... (version ..............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I give my permission for the focus group discussion to be tape-recorded

4. I understand that the tape-recordings will be destroyed after they have been analysed

5. I understand that although an invented name will replace my name on any reports, my anonymity cannot be guaranteed.

7. I agree to take part in the above study.

__________________________  ________________________________  ____________________
Your name Date Signature

__________________________  ________________________________  ____________________
Researcher’s name Date Signature

I am happy for you to contact me on the following number/s:

Home………………………………………………

Work………………………………………………..

Version 1 11th of March 2010 LREC No: 10/H0502/26
Appendix 3.4 - Letter of invitation for adults with food allergy: food choice behaviour study

Dear Patient,

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic adults

I would like to invite you to join a new study that I will be conducting. The study is about food allergic, suspected-food allergic, and non-food allergic consumers and how they chose the food they eat.

Although a lot of research has been done with food allergic adults, there is little in-depth knowledge about how a diagnosed allergy is influencing the food choices and how these areas can be targeted to better help them. Previous research has focussed on the impact of food allergy on the quality of life and indeed, research suggests that food allergic consumers have a reduced quality of life compared to non-food allergic. However, little is known about if and to what extent food allergy affects the food choice behaviour of food allergic consumers.

Therefore, I would like to talk to a group of food allergic adults like yourself about your attitudes, behaviour, beliefs and experiences that influence you in making your food choice decisions.

If you are interested in participating in the study please take time to read the enclosed information sheet. If you decide to participate then please sign and return the enclosed consent form. If you have any questions at all or would just like more information, then please do not hesitate to contact me at the address or telephone number above. If you ring and I am not in please leave a message and I will return your call as soon as possible. Thank you for taking you time to read this.

Yours sincerely

Isolde Sommer
PhD Student

Version 1 11th of Mach 2010 LREC No: 10/H0502/26
Dear Member

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic adults

My name is Isolde Sommer and I would like to invite you to join a research study that I will be conducting as part of my doctoral studies at University of Portsmouth under the supervision of Professor Dean. The study is about food allergic, suspected-food allergic, and non-food allergic consumers and how they choose the food they eat. I have approached the Anaphylaxis Campaign to help me recruit participants who have a wheat, milk, egg, peanut, tree nut, sesame, fish or crustaceans allergy diagnosed by a GP or allergist.

Although a lot of research has been done with food allergic adults, there is little in-depth knowledge about how food allergy is influencing the food choices. Previous research has focussed on the impact of food allergy on the quality of life and indeed, research suggests that food allergic consumers have a reduced quality of life compared to non-food allergic. However, little is known about if and to what extent food allergy affects the food choice behaviour of food allergic consumers. Therefore, I would like to talk to a group of food allergic adults like yourself about your experiences, behaviour, beliefs and attitude that influence you in making your food choice decisions.

If you are interested in participating in the study please take time to read the enclosed information sheet. If you decide to participate then please sign and return the enclosed consent form using the stamped addressed envelope. If you have any questions at all or would just like more information, please do not hesitate to contact me at the address/telephone number/email stated above.

Thank you for taking you time to read this.

Yours sincerely

Isolde Sommer

Appendix 1.1 - Letter of invitation for members of The Anaphylaxis Campaign: food choice behaviour study
Appendix 1: Screening questionnaire

An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic adults

Age: …………years

Gender:    Female    Male

Are you diagnosed with food allergy?     Yes    No

How were you diagnosed with food allergy?
Skin prick test    Blood test    Other

Doctor’s diagnosis    Food challenge

If you ticked Other please tell me what it is …………………………

What foods are you allergic to?
Egg    Milk    Peanuts    Tree nuts
Sesame    Crustaceans    Fish    Wheat

Others………………

Do you believe you have a food allergy, but you are not diagnosed yet?

Yes    No

If yes, why? ………………………………………………………………………..

If yes, what symptoms do you have?………………………………………………

Do you avoid food for other reasons than dislike?

Healthy diet    Food intolerance    Suspected food allergy

Makes me feel ill    Others

If Makes me feel ill, why? ……………………………………………………………

If Others, which? ……………………………………………………………………

Version 1   11th of March 2010   LREC No: 10/H0502/26
Appendix 1: Screening questionnaire

**What type of diet are you following?**

- Normal (eats meat and food from plants) □
- Vegetarian (no meat) □
- Vegan (eats only food from plant sources) □

**Do you have any diseases affecting the diet, e.g. diabetes?**

- Yes □
- No □

If yes, which? .................................................................

**Do you have any other condition affecting the diet?**

- Yes □
- No □

If yes, which? .................................................................

**Ethnicity:**

- White British □
- White European □
- White Other □
- Black: British Caribbean □
- Black: British African □
- Black: British other □
- Asian: British Indian □
- Asian: British Other □
- Mixed Background □
- Chinese □
- Other...................... □

**Highest Qualification:** .........................

**Occupation:** .........................

**Marital status:** Single □
- Married □
- Divorced □
- Widowed □

**Family size (number of individuals living at home):** ............

Thank you for completing this questionnaire!
Appendix 2.6: Worksheet

What did you eat and drink yesterday?

Breakfast:……………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
Snack before lunch:…………………………………………………………………………………………
………………………………………………………………………………………………………………
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Lunch:………………………………………………………………………………………………………………
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Snack after lunch:……………………………………………………………………………………………………
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Dinner:………………………………………………………………………………………………………………
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Snack after dinner:……………………………………………………………………………………………………
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Other:………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
………………………………………………………………………………………………………………
How do you choose your food?

The University of Portsmouth is inviting volunteers to consider participating in a study investigating the food choice behaviour of adults.

Eligibility criteria:

- You are aged 19-65
- Either you are likely to be allergic to egg, milk, peanuts, tree nuts, sesame, crustaceans, fish, or wheat, but you have not been diagnosed at any time in your life
- Or you do not have any food allergy at all
- And you do not have any other illnesses affecting your food choice

For further information please contact:

Isolde Sommer  
PhD student  
Tel: (0)23 92844434  
e-mail: isolde.sommer@port.ac.uk

Participants will receive a £ 10 gift voucher!
Focus Group Topic Guide

Project title: An investigation of food choice behaviour of food allergic and non-food allergic consumers

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<th>Name of Moderator_______________________</th>
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<tr>
<td>Date______________________________</td>
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<td>Attendees______________________________</td>
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Introduction

Good morning/afternoon. My name is Isolde, I am a PhD student at the University of Portsmouth to facilitate today's focus group. With me is my colleague.............. .................She/he is here to take notes, in case the recording equipment fails and to observe the procedure, answer questions afterwards and arrange reimbursement of travel expenses, etc.

Thank you for coming today.

Present the purpose

We are here today to talk about your attitudes, behaviour, beliefs and experiences that influence your daily eating habits. We have a list of topics open for discussion, for example: eating habits, eating out, and food and emotions. We will be starting with the eating habits.

I am not here to share information, to give you my opinions or judge what you say. Your ideas and opinions are what matter. There are no right or wrong, desirable or undesirable answers. You can disagree with each other, and you can change your mind at any time. I would like you to feel comfortable saying what you really think and how you make your food choices. There are light refreshments available, feel free to help yourself if you have not already done so. Water is available for you throughout the discussion.

Discuss procedure

My colleague will be taking notes and audio-recording the discussion so that we do not miss anything you have to say. This was explained in the patient information sheet you received with the information pack. As you know everything you say is confidential. No one will know who said what. No one will be identifiable from what they say or in any report written about the focus group discussion. However, I would like to point out here that we will be anonymising data used but verbatim quotes will be used to illustrate points made. It is possible that somebody may recognise your pattern of speech or words used, but we will not attribute your name to anything used. I want this to be a group discussion, so feel free to respond to me and to other members in the group without waiting to be called on. However, I
would appreciate it if only one person to spoke at a time. Please try to speak clearly. The discussion will last approximately one hour depending on what you want to share. There is a lot to discuss, so if I need to I may move us along a bit. You should have all signed a consent form – if not please do so now. If we can also switch off mobile phones. Has anybody got any questions?

**Participant introduction**

*Now, let's start by everyone sharing their name and a favourite hobby / pastime. We’ll go round the room starting with ...*

**Interview**

*You should have all completed a short worksheet when you arrived today. Would you like to tell us what you have eaten the previous day? Perhaps start with....*

**Eating habits**

Probes (if these topics do not spontaneously come up in discussion): Can anybody share with us why he/she chose those foods and not others? What factors influenced the food choice? Are some factors influencing the food choice particularly strong? Does this change from one time to the other? In what situations does the reason you eat sometimes change? Has anybody different eating habits on the weekends?

**Food Preparation**

*When it comes to food preparation, does anyone want to share with us what he/she considers?*

Prompts: Do you prefer to prepare your meals or eat out?, What is the difference between a meal and a snack?

**Eating out**

*Personal circumstances or special occasions often do not allow us to have a meal at home. Can anybody tell us about her/his eating out habits?*

Prompt: How often?, What places?, How does anybody decide where to go when he/she wants to eat out?, What about fast foods?, If so, why?
**Food, family and community**

Eating is sometimes considered to have a great social impact. What do you think influences you when eating with others?

Prompt: Food and eating in the family? How often does the family eat together?, What meals are family meals, and when do they occur? Why or why not? How important is food and eating in the family? Eating with friends? Who in the family prepares the food? Who chooses what the family will eat?

**Food and emotions**

Sometimes what we eat is influenced by our feelings. Can anybody share their experiences of how their mood has influenced their eating habits?

Prompt: How?, What foods are eaten when someone feels good?, What foods are eaten when someone feels bad?, How are snacks influenced by moods?

**Purchasing**

Let’s turn to food purchasing. Would anyone share with us how he/she is doing the food shopping?

Prompt: How often?, How does anybody decide what to buy?, Where?

**Food and health beliefs**

A number of people try to follow a healthy diet. Would you like to tell us if or how important it is for you to eat healthy foods?

Prompt: Are there any foods that do and do not go together?, Are there any things that are bad to eat?, What foods are good to eat?, What are the advantages and disadvantages of eating a healthy diet?, What are the barriers to eating a healthy diet?

*(Food Allergy – if not already mentioned)*

You are all here because you have a food allergy. Does anyone like to share with us what difficulties you have when it comes to buying and eating food?
Prompt: Do all of you read the label?, How often?, If not, why?, Has anybody experiences of eating food that might have contained some allergen?, If so-why?, What was the most difficult adjustment that was made because of the food allergy?, Are there any barriers when eating out in restaurants?, If yes, which?)

Closure

Though there were many different opinions about food choice behaviour, all of which is very interesting and will, I am sure, help to inform us about its use in the future. Does anyone want to add or clarify an opinion on this?

Thank you very much for coming this afternoon. Your time is very much appreciated and your comments have been very helpful. After you have left today if there is anything that you feel you have forgotten to say please contact me again. Don’t forget to give ....your travel claim form and receipts where applicable and we will endeavour to get the money reimbursed as quickly as possible. Also don’t forget to collect your £10 token from ....before you leave today.

Please have a safe journey home

Thank you
An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

Information sheet

Part 1: Some information for you about the project

I am asking you if you would agree to take part in a research project. In this project we are trying to answer the question “How do you make your food choice decisions?” before you decide if you want to take part or not it is important to understand why the research is being done and what it will involve for you. So please read this leaflet carefully. Talk about it with your family and friends, if you want to.

Thank you for reading this.

Why am I doing this research?

At the moment we do not know if and to what extent food allergy affects the food choice behaviour of food allergic teenager. Therefore, it is important to understand what attitudes, behaviour, beliefs and experiences influence the way food-allergic teenagers decide what to eat. Therefore, I need teenagers of three different groups (teenagers with a diagnosed food allergy, teenagers who are likely to have a food allergy, teenagers who do not have a food allergy) to make our findings comparable. I hope this research will help improve the health and lives of teenagers with a food allergy.

Why have I been asked to take part?

I would like to talk with teenagers (aged 12-18) about their food choice behaviour. You have been contacted because you have participated in a previous study. You are a teenager to whom one of the following conditions applies: (1) you are diagnosed with a food allergy; (2) you suspect to have a food allergy; (3) you do not suffer from any food allergy at all. I will be asking 24-30 teenagers to take part in the research.

Do I have to take part?

No! It is up to you. If you do you will be asked sign (write your name) on a form to say you would like to take part. You will be given a copy of this information sheet and the form you signed (consent form) to keep. If you wish to stop taking part at any time during the research you are free to do so without giving a reason.

What will happen to me if I take part?
If you decide to take part in the study I would like to invite you to join a focus group, which is really an informal group discussion. The focus group will have up to 9 other teenagers with a food allergy (or not), an assistant and myself. The group is going to be held at the Quay Arts Centre at a date and time that is most convenient to the participants. The focus group will be very informal and refreshments will be available. The refreshments will only include foods participants are not allergic to. The group will be conducted as a relaxed discussion, with very little participation from myself, other than to introduce a few ideas for discussion. I anticipate that it will last between 1-1 ½ hours. I would like to tape record the group’s discussions. These recordings will then be typed word by word and analysed.

What will I be asked to do?

You will be asked to take part in one focus group discussion. In the focus group discussion I will ask questions on how you make your food choice decisions. For example, I will ask about why and what food you choose when eating at your school, with friends and at home. If there are questions you do not know how to answer or do not want to answer you do not have to answer them. Please do also prepare the enclosed sheet on what you have eaten the day before and bring it along.

What are the benefits of taking part?

You would not personally benefit from participating in the study. However, I hope that this study will provide a comprehensive insight into the food choice behaviour of teenager with a food allergy compared to non-allergic teenager. You would make a contribution to a better understanding on what influences the dietary pattern of teenager in general, and those with a food allergy.

Is there anything to be worried about if I take part?

I hope that taking part in the focus group discussion will not be upsetting for you. It is up to you what you talk about during the discussion. If you do become upset, we will check with you whether your comments will be included in the final analysis or not.

What if there is a problem?

If you are unhappy about any art of the project, you are welcome to contact me, Isolde Sommer, on 023 92844434 or isolde.sommer@port.ac.uk or Prof Tara Dean on 023 92845243 or tara.dean@port.ac.uk.

Contact Details

If you would like to know anything else about this study of if you have any questions about this study you are welcome to ring me (Isolde Sommer) on 023 9284 4434. I will call you straight back.

Thank you for reading this so far. If you are still interested please go to Part 2.

Part 2: Information you need to know if you still wish to take part.
What will happen if I don’t want to carry on with the research?

If you do not want to carry on with the food group discussion or if you change your mind about taking part please let me know. You can then stop taking part in the study.

What happens when the research project stops?

After the focus group discussion, I will type up what was said. I will then write up my findings and send you a short report about everything I have found during the discussion. At the end of the study I will write a big report about everything I have found. If you would like a copy of this report I can send this to you too.

Will anyone else know I am doing this?

The information you give will be kept confidential. This means I am the only person that will know which comment belongs to you and I will not tell anybody that you have taken part. I will use a code for each participant when I analyse the discussion. Both the tape and the typed up discussion will be kept safe in a locked cabinet. I will be the only person who can open this cabinet. The tapes and the typed up discussion will be destroyed in 3 years time. When the study has ended I will be writing a report and might use some of what you said in this. If I do, I will not use your name and will not include anything that might help people to guess it was you.

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented orally to conferences and individuals and organisations with an interest in them.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. People of the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight are involved in the study.

Who has reviewed the study?

Before any research can be carried out it has to be approved by an ethics committee. They make sure that the research is okay to do. This project has been checked by the Southampton and South West Hampshire Research Ethics Committee A.

Thank you for taking the time to read this. If you have any questions please ask. I would be very happy to speak with you.
Appendix 2.3

An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

Information sheet

Part 1: Some information for you about the project

I am asking you if you would agree to take part in a research project. In this project we are trying to answer the question “How do you make your food choice decisions?” before you decide if you want to take part or not it is important to understand why the research is being done and what it will involve for you. So please read this leaflet carefully. Talk about it with your family and friends, if you want to.

Thank you for reading this.

Why am I doing this research?

At the moment we do not know if and to what extent food allergy affects the food choice behaviour of food allergic teenagers. Therefore, it is important to understand what attitudes, behaviour, beliefs and experiences influence the way food-allergic teenagers decide what to eat. Therefore, I need teenagers of three different groups (teenagers with a diagnosed food allergy, teenagers who are likely to have a food allergy, teenagers who do not have a food allergy) to make our findings comparable. I hope this research will help improve the health and lives of teenagers with a food allergy.

Why have I been asked to take part?

I would like to talk with teenagers (aged 12-18) about their food choice behaviour. You are a teenager to whom one of the following conditions applies: (1) you are diagnosed with a food allergy; (2) you suspect to have a food allergy; (3) you do not suffer from any food allergy at all. I will be asking 24-30 teenagers to take part in the research.

Do I have to take part?

No! It is up to you. If you do you will be asked sign (write your name) on a form to say you would like to take part. You will be given a copy of this information sheet and the form you signed (consent form) to keep. If you wish to stop taking part at any time during the research you are free to do so without giving a reason.

What will happen to me if I take part?

I will ask you and your parent(s)/legal guardian(s) where and when you would like to take part. You can choose where you would like me to talk with you. I can come to your home or you can come to my office at the University of Portsmouth.
Appendix 2.3

I will talk with you in an interview. This will be recorded using a tape recorder so that I can remember all that was said. I will be asking you questions on how you make your food choice decisions. It is up to you to decide how long the interview takes. You can ask for the tape to be stopped at any time if you would like to stop the interview. The interview will last between 1 hour and 1 hour 30 minutes depending on what you would like to talk about.

What will I be asked to do?

You will be asked to take part in one interview. I will interview you without your parent(s)/legal guardian(s) in the room although I will ask them to make sure I can get in touch with them. In the interview I will ask questions on how you make your food choice decisions. For example, I will ask about why and what food you choose when eating at your school, with friends and at home. If there are questions you do not know how to answer or do not want to answer you do not have to answer them. Please do also prepare the enclosed sheet on what you have eaten the day before and bring it along.

What are the benefits of taking part?

You would not personally benefit from participating in the study. However, I hope that this study will provide a comprehensive insight into the food choice behaviour of teenager with a food allergy compared to non-allergic teenager. You would make a contribution to a better understanding on what influences the dietary pattern of teenager in general, and those with a food allergy.

Is there anything to be worried about if I take part?

I hope that taking part in the interview will not be upsetting for you. It is up to you what you talk about during the interview. If you do become upset, we will check with you whether your comments will be included in the final analysis or not.

What if there is a problem?

If you are unhappy about any art of the project, you are welcome to contact me, Isolde Sommer, on 023 92844434 or isolde.sommer@port.ac.uk or Prof Tara Dean on 023 92845243 or tara.dean@port.ac.uk.

Contact Details

If you would like to know anything else about this study of if you have any questions about this study you are welcome to ring me (Isolde Sommer) on 023 9284 4434. I will call you straight back.

Thank you for reading this so far. If you are still interested please go to Part 2.
Appendix 2.3

Part 2: Information you need to know if you still wish to take part.

What will happen if I don’t want to carry on with the research?

If you do not want to carry on with the interview or if you change your mind about taking part please let me know. You can then stop taking part in the study.

What happens when the research project stops?

After the interview, I will type up what was said. I will send this to you to read to make sure it was as you remember it. If you would like you can also change your mind about some of the things you have said. I will then read all of the interviews and write up my findings. After that I will send you a short report telling you a bit what I have found. At the end of the study I will write a big report about everything I have found. If you would like a copy of this report I can send this to you too.

Will anyone else know I am doing this?

The information you give will be kept confidential. This means I am the only person that will know which interview belongs to you and I will not tell anybody that you have taken part. I will use an invented name when I write up your interview. Both the tape and the typed up interview will be kept safe in a locked cabinet. I will be the only person who can open this cabinet. The tapes and the typed up interview will be destroyed in 3 years time. When the study has ended I will be writing a report and might use some of what you said in this. If I do, I will not use your name and will not include anything that might help people to guess it was you.

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented orally to conferences and individuals and organisations with an interest in them.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. People of the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight are involved in the study.

Who has reviewed the study?

Before any research can be carried out it has to be approved by an ethics committee. They make sure that the research is okay to do. This project has been checked by the Southampton and South West Hampshire Research Ethics Committee A.

Thank you for taking the time to read this. If you have any questions please ask. I would be very happy to speak with you.

Version 2 27th of April 2010 LREC No: 10/H0502/26
Dear Parent/Legal guardian(s),

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food choice behaviour of teenagers. I would like to compare the food choice behaviour of teenagers with a diagnosed food allergy to those of teenagers with a suspected food allergy and to those of teenagers without a diagnosed/suspected food allergy.

I am writing to you as your son/daughter has expressed interest to take part in this study and I would like to ask for your permission to do so first. Below is some information for you about the study. I have also included with this letter some information for your son/daughter about the study, a questionnaire, a worksheet and a consent form for him/her to reply with if he/her would like to take part. There is no need to reply to this letter. If you are happy for your son/daughter to take part, please pass the enclosed documents to him/her to read. If your son/daughter is keen to take part they can then complete their own consent form together with a screening questionnaire and return the forms to me in the stamped addressed envelope provided. If you are not happy for your son/daughter to take part please discard the enclosed documents or return them to me in the stamped addressed envelope provided.

What is the study about?

I would like to talk with teenagers, like your son/daughter, who either have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all. At the moment we know very little about what influences the food choice behaviour of teenagers with a diagnosed or suspected food allergy. If we can understand how teenagers with a diagnosed or suspected food allergy make their food choice decisions compared to those without, we can develop better ways of helping them.

I am looking to talk with teenagers who:

1. Do have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all.
Appendix 2.1

2. Are aged between 12 and 18.
3. Do not have any other conditions affecting the food choice, e.g. diabetes...

What would taking part involve?

If your son/daughter agreed to take part in the study, he/she would participate in a focus group discussion along with 7-9 other teenagers. The focus group discussion will take place at school at a date and time to be arranged once a sufficient number of participants have got back to me. Refreshments will be available and participants will receive a £10 gift voucher to thank them for their time. The discussions will be carried out without you present, although I would ask that you provide a telephone number so that we can contact you if necessary. The focus group discussion will be audio taped and would last between 1 and 1 ½ hours depending on what they would like to talk about. I have enclosed an information sheet for you, which gives you some more details about the study.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours Sincerely,

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
Appendix 2.1

Dear Parent/Legal guardian(s),

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

You may recall the Food Allergy and Intolerance Research (FAIR) study your child took part in 2002-2004. One of the main investigators of the FAIR study was Prof Tara Dean from the David Hyde Asthma and Allergy Research Centre on the Isle of Wight. My name is Isolde Sommer and I am a PhD student at the University of Portsmouth under the supervision of Prof Tara Dean. I am conducting a research study on food choice behaviour of teenagers. I would like to compare the food choice behaviour of teenagers with a diagnosed food allergy to those teenagers with a suspected food allergy and those without any food allergies. I am writing to you as I would like to invite your son/daughter to take part in this study.

I would like to approach your son/daughter to ask if they would be interested in participating in my study but wanted to ask for your permission to do so first. Below is some information for you about the study. I have also included with this letter some information for your son/daughter about the study, a letter inviting him/her to take part and a consent form for him/her to reply with if s/he would like to take part. There is no need for you to reply to this letter. If you are happy for me to approach your son/daughter please pass the enclosed documents to him/her to read. If your son/daughter is keen to take part they can then complete their own consent form together with a screening questionnaire and return the forms to me in the stamped addressed envelope provided. If you are not happy for me to approach your son/daughter please discard the enclosed documents or return them to me in the stamped addressed envelope provided.

What is the study about?

I would like to talk to teenagers, like your son/daughter, who either have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all. At the moment we know very little about what influences the food choice behaviour of teenagers with a diagnosed or suspected food allergy. If we can understand how teenagers with a diagnosed or suspected food allergy make their food choice decisions compared to those without, we can develop better ways of helping them.
I am looking to talk with teenagers who:

1. Do have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all.
2. Are aged between 12 and 18.
3. Do not have any other conditions affecting the food choice, e.g. diabetes.

What would taking part involve?

If your son/daughter agreed to take part in the study, he/her would participate in a focus group discussion along with 7-9 other teenagers. The focus group discussion will take place at the Quay Arts Centre at a date and time that is most convenient to the participants. Refreshments will be available and participants will receive a £10 gift voucher to thank them for their time. The discussions will be carried out without you present, although I would ask that you provide a telephone number so that we can contact you if necessary. The focus group discussion will be audio taped and would last between 1 and 1 ½ hours depending on what they would like to talk about. I have enclosed an information sheet for you and your son/daughter, which gives some more details about the study.

If you have any questions about the study please telephone me on 023 92844434 or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours Sincerely,

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
Dear Parent/Legal guardian(s),

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food choice behaviour of teenagers. I would like to compare the food choice behaviour of teenagers with a diagnosed food allergy to those of teenagers with a suspected food allergy and to those of teenagers without a diagnosed/suspected food allergy.

I am writing to you as your son/daughter has expressed interest to take part in this study and I would like to ask for your permission to do so first. Below is some information for you about the study. I have also included with this letter a parental consent form, some information for your son/daughter about the study, a questionnaire, a worksheet and a consent form for him/her to reply with if he/her would like to take part. There is no need to reply to this letter. If you are happy for your son/daughter to take part, please sign the parental consent form and pass the other documents to him/her to read. If your son/daughter is keen to take part they can then complete their own consent form together with a screening questionnaire and return the forms to me in the stamped addressed envelope provided. If you are not happy for your son/daughter to take part please discard the enclosed documents or return them to me in the stamped addressed envelope provided.

What is the study about?

I would like to talk with teenagers, like your son/daughter, who EITHER have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all. At the moment we know very little about what influences the food choice behaviour of teenagers with a diagnosed or suspected food allergy. If we can understand how teenagers with a diagnosed or suspected food allergy make their food choice decisions compared to those without, we can develop better ways of helping them.

I am looking to talk with teenagers who:
Appendix 2.1

1. Do have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all.
2. Are aged between 12 and 18.
3. Do not have any other conditions affecting the food choice, e.g. diabetes...

What would taking part involve?

If your son/daughter agreed to take part in the study, I would interview him/her at a time and place that suits him/her. The interview will be carried out without you present, although I would ask that you provide a telephone number so that we can contact you if necessary. The interview would be audio taped and would last between 1 hour and 1 hour 30 minutes depending on what they would like to talk about. I have enclosed an information sheet for you, which gives you some more details about the study. Participants will receive a £10 gift voucher to thank them for their time.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours Sincerely,

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
PARTICIPANT CONSENT FORM

Title of Project: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

Name of Researcher: Miss Isolde Sommer

Please initial box

1. I confirm that I have read and understand the information sheet dated ......................... (version ............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I give my permission for the focus group discussion to be tape-recorded

4. I understand that the tape-recordings will be destroyed after they have been analysed

5. I understand that although an invented name will replace my name on any reports, my anonymity cannot be guaranteed.

6. I agree to take part in the above study.

Your name __________________________ Date __________ Signature __________

Researcher’s name __________________________ Date __________ Signature __________

I am happy for you to contact me on the following number/s:

Home…………………………………………………

Work…………………………………………………..

Version 1 11th of March 2010 LREC No: 10/H0502/26
Study Number:
Patient Identification Number for this study:

PARTICIPANT CONSENT FORM

Title of Project: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

Name of Researcher: Miss Isolde Sommer

Please initial box

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3. I give my permission for the interview to be tape-recorded

4. I understand that the tape-recordings will be destroyed after they have been analysed

5. I understand that although an invented name will replace my name on any reports, my anonymity cannot be guaranteed.

7. I agree to take part in the above study.

_________________________  _________________________  _________________________
Your name                   Date                  Signature

_________________________  _________________________  _________________________
Researcher’s name           Date                  Signature

I am happy for you to contact me on the following number/s:

Home………………………………………………   

Work………………………………………………..

Version 1 11th of March 2010 LREC No: 10/H0502/26

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Study Number: 
Patient Identification Number for this study:

PARENTAL CONSENT FORM

Title of Project: An investigation of food choice behaviour of food-allergic, suspected-food allergic, and non-food allergic teenagers

Name of Researcher: Miss Isolde Sommer

Please initial box

1. I confirm that I have read and understand the information sheet dated ......................... (version .............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my and my son’s/daughter’s participation is voluntary and that I, and my son or daughter are free to withdraw at any time and without giving any reason.

3. I give my permission for the focus group discussion to be tape-recorded

4. I understand that the tape-recordings will be destroyed after they have been analysed

5. I understand that although an invented name will replace my son’s/daughter’s name on any reports, his/her anonymity cannot be guaranteed.

6. I agree to my son/daughter taking part in the study.

_________________________ ____________________________ 
Your name Date Signature

_________________________ ____________________________ 
Researcher’s name Date Signature

Version 1 27th of April 2010 LREC No: 10/H0502/26
Study Number: 
Patient Identification Number for this study: 

PARENTAL CONSENT FORM

Title of Project: An investigation of food choice behaviour of food-allergic, suspected-food allergic, and non-food allergic teenagers

Name of Researcher: Miss Isolde Sommer

Please initial box

1. I confirm that I have read and understand the information sheet dated .................. (version ............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my and my son’s/daughter’s participation is voluntary and that I, and my son or daughter are free to withdraw at any time and without giving any reason.

3. I give my permission for the interview to be tape-recorded.

4. I understand that the tape-recordings will be destroyed after they have been analysed.

5. I understand that although an invented name will replace my son’s/daughter’s name on any reports, his/her anonymity cannot be guaranteed.

6. I agree to my son/daughter taking part in the study.

_________________________    _________________________ 
Your name                  Date              Signature

_________________________    _________________________ 
Researcher’s name          Date              Signature

Version 1  27th of April 2010  LREC No: 10/H0502/26
Dear [name of headteacher],

Re An investigation of food choice behaviour of food allergic, perceived-food allergic, and non-food allergic teenagers

I am Director of Research at University of Portsmouth and my own personal area of research is food allergies and it is in this capacity that I am writing to you. One of the projects we are involved with is looking into food choice behaviour of both allergic and non-allergic teenagers.

One of my doctorate students, Isolde Sommer is leading on this area of work. We have already conducted some of this work with teenagers on the Isle of Wight schools and we are now keen to extend it to students in the Portsmouth area. The research involves interviewing teenagers about how they make their food choice decisions. We would like to approach 3 groups of teenagers. Those who have already been diagnosed with a food allergy, those who have a perceived food allergy, but have never been diagnosed at any time in their life, and those who do not suffer from food allergy at all. In order to conduct these interviews we need to recruit 10 teenagers between the ages of 12 to 18 years for each group, requiring about 30 teenagers in total.

I would like to work with your school and ask for your help and invite some of the teenagers in your school to take part in an interview. The interview can either be done during school or after school, depending on which is most convenient to you and the teenager. Ideally we would like to carry out 30 interviews and each interview would last approximately one to one and a half hours. Naturally each school may only be able to contribute a few individuals towards this.

If you would consider helping with this research I would be most grateful if you could let me know, Isolde who is leading in this area will be only too happy to visit you to discuss logistics etc in more detail which is indeed what has been done with the Island schools.

If the school is interested, we would also be happy to give a general talk on food allergy awareness to students and/or staff.

I look forward to hearing from you.

Yours sincerely,

Tara Dean
Director of Research
University of Portsmouth

Version 1 1st of February 2010 LREC No: 10/H0502/26
Dear [name of headteacher],

Re An investigation of food choice behaviour of food allergic, perceived-food allergic, and non-food allergic teenagers

I am Director of Research at University of Portsmouth and my own personal area of research is food allergies and it is in this capacity that I am writing to you. One of the projects we are involved with is looking into food choice behaviour of both allergic and non-allergic teenagers.

One of my doctorate students, Isolde Sommer is leading on this area of work. We have already conducted some of this work with teenagers on the Isle of Wight schools and we are now keen to extend it to students in the Portsmouth area. The research involves interviewing teenagers about how they make their food choice decisions. We would like to approach 3 groups of teenagers. Those who have already been diagnosed with a food allergy, those who have a perceived food allergy, but have never been diagnosed at any time in their life, and those who do not suffer from food allergy at all. In order to conduct these interviews we need to recruit 10 teenagers between the ages of 12 to 18 years for each group, requiring about 30 teenagers in total.

I would like to work with your school and ask for your help and invite some of the teenagers in your school to take part in an interview. The interview can either be done during school or after school, depending on which is most convenient to you and the teenager. Ideally we would like to carry out 30 interviews and each interview would last approximately one to one and a half hours. Naturally each school may only be able to contribute a few individuals towards this.

If you would consider helping with this research I would be most grateful if you could let me know. Isolde who is leading in this area will be only too happy to visit you to discuss logistics etc in more detail which is indeed what has been done with the Island schools.

If the school is interested, we would also be happy to give a general talk on food allergy awareness to students and/or staff.

I look forward to hearing from you.

Yours sincerely,

Tara Dean
Director of Research
University of Portsmouth
Dear Participant,

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food choice behaviour of teenagers. I would like to compare the food choice behaviour of teenagers with a diagnosed food allergy to those of teenagers with a suspected food allergy and to those of teenagers without a diagnosed/suspected food allergy. I am writing to you as you have been diagnosed with a food allergy and I would like to invite you to take part in this study.

What is the study about?

I would like to talk with teenagers, like you, who have either a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all. At the moment we know very little about what influences the food choice behaviour of teenagers with a diagnosed or suspected food allergy. If we can understand how teenagers with a diagnosed or suspected food allergy make their food choice decisions compared to those without, we can develop better ways of helping them.

I am looking to talk with teenagers who:

1. Do have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all.
2. Are aged between 12 and 18.
3. Do not have any other conditions affecting the food choice, e.g. diabetes...

What would taking part involve?

If you agreed to take part in the study, you would participate in a focus group discussion along with 7-9 other teenagers. The focus group discussion will take place at the Quay Arts centre on the Isle of Wight at a date and time that is most convenient to the participants. Refreshments will be available and participants will receive a £10 gift voucher to thank them for their time. The focus group discussion will be audio-taped and would last between 1 and 1
Appendix 2.2

½ hours depending on what you would like to talk about. I have enclosed a 3-page information sheet for you, which gives you some more details about the study.

What should I do next?

If you would like to take part please complete the participant consent form and questionnaire that I have attached and return this to me. This should only take a few minutes to complete and I have enclosed a stamped addressed envelope for your convenience. Additionally, I would ask you to prepare a worksheet on what you have eaten the day before the discussion. If you would not like to take part you do not need to reply to this letter, and I would like to thank you for taking the time to read about the study.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours Sincerely,

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
Appendix 2.2

Dear Participant,

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food choice behaviour of teenagers. I would like to compare the food choice behaviour of teenagers with a diagnosed food allergy to those of teenagers with a suspected food allergy and to those of teenagers without a diagnosed/suspected food allergy. I am writing to you as you have been diagnosed with a food allergy and I would like to invite you to take part in this study.

What is the study about?

I would like to talk with teenagers, like you, who have either a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all. At the moment we know very little about what influences the food choice behaviour of teenagers with a diagnosed or suspected food allergy. If we can understand how teenagers with a diagnosed or suspected food allergy make their food choice decisions compared to those without, we can develop better ways of helping them.

I am looking to talk with teenagers who:

1. Do have a diagnosed OR suspected food allergy OR do not suffer from any food allergy at all.
2. Are aged between 12 and 18.
3. Do not have any other conditions affecting the food choice, e.g. diabetes...

What would taking part involve?

If you agreed to take part in the study, I would interview you at a time and place that suits you. I would interview you without your parent(s)/legal guardian(s) in the room although I would ask them to make sure I can get in touch with them. The interview would be audio-taped and would last between 1 and 1 ½ hours depending on what you would like to talk about. I have enclosed a 3-page information sheet for you, which gives you some more
Appendix 2.2

details about the study. Participants will receive a £10 gift voucher to thank them for their time.

What should I do next?

If you would like to take part please complete the participant consent form and questionnaire that I have attached and return this to me. This should only take a few minutes to complete and I have enclosed a stamped addressed envelope for your convenience. Additionally, I would ask you to prepare a worksheet on what you have eaten the day before the interview. If you would not like to take part you do not need to reply to this letter, and I would like to thank you for taking the time to read about the study.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours Sincerely,

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
HOW DO YOU CHOOSE YOUR FOOD?
Volunteers needed for a Research Study

The University of Portsmouth is conducting a research study on food choice behaviour of teenagers. You will be asked to attend a lunchtime focus group for up to 1 hour at your school to talk about your attitudes, behaviour, beliefs and experiences on how you decide what food to eat.

Participants will receive a £10 gift voucher!!

Please contact your Form Tutor for further information!

You can take part if:
- You are aged 12-18
- You have food allergies diagnosed by a doctor,
- OR think you may have a food allergy but has never been diagnosed
- OR can eat pretty much anything!!!
- AND you do not have any other illnesses affecting your food choice (e.g. diabetes)
Appendix 2: Screening questionnaire

An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic teenagers

Age: …………years

Gender: Female □ Male □

Are you diagnosed with food allergy? Yes □ No □

How were you diagnosed with food allergy?

Skin prick test □ Blood test □ Other □

Doctor’s diagnosis □ Food challenge □

If you ticked Other please tell me what it is ………………………

What foods are you allergic to?

Egg □ Milk □ Peanuts □ Tree nuts, e.g. walnuts □

Sesame □ Crustaceans, e.g. shrimps □ Fish □ Wheat □

Others…………….

Do you believe to have a food allergy, but you are not diagnosed yet?

Yes □ No □

If yes, why? ........................................................................................................

If yes, what symptoms do you have?............................................................

Do you avoid food for other reasons than dislike?

Healthy diet □ Food intolerance □ Suspected food allergy □

Makes me feel ill □ Others □

If Makes me feel ill, why? ..............................................................................

If Others, which? .........................................................................................

Version 1 11th of March 2010 LREC No: 10/H0502/26
Appendix 2: Screening questionnaire

What type of diet are you following?
Normal (eats meat and food from plants)  □
Vegetarian (no meat)  □
Vegan (eats only food from plant sources)  □

Do you have any diseases affecting the diet, e.g. diabetes? Yes □ No □
If yes, which? .................................................................

Do you have any other condition affecting the diet? Yes □ No □
If yes, which? .................................................................

Ethnicity:
White British  □ White European  □ White Other  □
Black: British Caribbean  □ Black: British African  □ Black: British other  □
Asian: British Indian  □ Asian: British Other  □ Mixed Background  □
Chinese  □ Other………………  □

Do your parents work....?
Mother  □  □  □  □
Father  □  □  □  □

Family size (number of individuals living at home): ............
Appendix 2: Screening questionnaire

What is the highest qualification your mother and father hold?

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>CSE/ GCSE/ O-level</th>
<th>A-level(s)</th>
<th>NVQ</th>
<th>HND</th>
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Thank you for completing this questionnaire!
Focus Group Topic Guide

Project title: An investigation of food choice behaviour of food allergic and non-food allergic consumers

Name of Moderator ___________________________
Date ___________________________
Attendees ___________________________

Introduction

Good morning/afternoon. My name is Isolde, I am a PhD student at the University of Portsmouth to facilitate today’s focus group. With me is my colleague………………. ………………………………………. She/he is here to take notes, in case the recording equipment fails and to observe the procedure, answer questions afterwards and arrange reimbursement of travel expenses, etc.

Thank you for coming today.

Present the purpose

We are here today to talk about your attitudes, behaviour, beliefs and experiences that influence your daily eating habits. We have a list of topics open for discussion, for example: eating habits, eating out, and food and emotions. We will be starting with the eating habits.

I am not here to share information, to give you my opinions or judge what you say. Your ideas and opinions are what matter. There are no right or wrong, desirable or undesirable answers. You can disagree with each other, and you can change your mind at any time. I would like you to feel comfortable saying what you really think and how you make your food choices. There are light refreshments available, feel free to help yourself if you have not already done so. Water is available for you throughout the discussion.

Discuss procedure

My colleague will be taking notes and audio-recording the discussion so that we do not miss anything you have to say. This was explained in the patient information sheet you received with the information pack. As you know everything you say is confidential. No one will know who said what. No one will be identifiable from what they say or in any report written about the focus group discussion. However, I would like to point out here that we will use a code for each participant when we analyze the discussion but direct quotes will be used to illustrate points made. It is possible that somebody may recognise your pattern of speech or words used, but we will not attribute your name to anything used. I want this to be a group discussion, so feel free to respond to me and to other members in the group without waiting.
to be called on. However, I would appreciate it if only one person to spoke at a time. Please try to speak clearly. The discussion will last approximately one hour depending on what you want to share. There is a lot to discuss, so if I need to I may move us along a bit. You should have all signed a consent form – if not please do so now. If we can also switch off mobile phones. Has anybody got any questions?

Participant introduction

Now, let's start by everyone sharing their name, what year you are in at school and or favourite hobby / pastime. We’ll go round the room starting with …

Interview

You should have all completed a short worksheet when you arrived today. Would you like to tell us what you have eaten the previous day? Perhaps start with….

Eating habits

Probes (if these topics do not spontaneously come up in discussion): Can anybody share with us why he/she chose those foods and not others? What factors made you decide to choose that food? Are some factors deciding to choose that food particularly strong? Does this change from one time to the other? In what situations does the reason you eat sometimes change? Has anybody different eating habits on the weekends?

Eating out

Personal circumstances often do not allow us to have a meal at home. Can anybody tell us about her/his eating out habits?

Prompt: How often?, What places?, How does anybody decide where to go when he/she wants to eat out?, What about fast foods?, If so, why?

Food, family and community

Eating is considered to have a great social impact. What do you think influences you when eating with others?
Prompt: Food and eating in the family? How often does the family eat together?, What meals are family meals, and when do they occur? Why or why not? Eating with friends? What would be served at a party?

Food and emotions

*Sometimes what we eat is influenced by our feelings. Can anybody share their experiences of how their mood has influenced the eating habits?*

Prompt: How?, What foods are eaten when someone feels good?, What foods are eaten when someone feels bad?, How are snacks influenced by moods?

Food and health beliefs

*A number of people try to follow a healthy diet. Would you like to tell us if or how important it is for you to eat healthy foods?*

Prompt: Are there any foods that do and do not go together?, Are there any things that are bad to eat?, What foods are good to eat?, What are the advantages and disadvantages of eating a healthy diet?, What are the barriers to eating a healthy diet? Does anybody eat healthier when eating with the family?

Development of food preferences

*Food preferences develop during growth. Can anyone tell us what changes you made in what you eat over the last few years?*

Prompt: What triggered that change? What brought it about?

(Food Allergy – if not already mentioned)

*You are all here because you have a food allergy. Does anyone like to share with us what difficulties you have when it comes to buying and eating food?*

Prompt: Do all of you read the label?, How often?, If not, why?, Has anybody experiences of eating food that might have contained some allergen?, If so-why?, What was the most difficult adjustment that was made because of the food allergy?, Are there any barriers when eating out in restaurants?, If yes, which?)

Closure
Though there were many different opinions about food choice behaviour, all of which is very interesting and will, I am sure, help to inform us about its use in the future. Does anyone want to add or clarify an opinion on this?

Thank you very much for coming this afternoon. Your time is very much appreciated and your comments have been very helpful. After you have left today if there is anything that you feel you have forgotten to say please contact me again. Don’t forget to give ……..your travel claim form and receipts where applicable and we will endeavour to get the money reimbursed as quickly as possible. Also don’t forget to collect your £10 token from ……..before you leave today.

Please have a safe journey home

Thank you
Interview Topic Guide

Project title: An investigation of food choice behaviour of food allergic and non-food allergic consumers

Name of Interviewer_______________________

Date_______________________

Venue_______________________

Verbal explanation of project and process: YES/NO
Written information given: YES/NO
Consent form: YES/NO

- Test recording equipment
- Briefly describe the project again before starting the interview;

I would just like to go over the project and what we will be doing today again with you, before we start the interview. The project is interested in the attitudes, behaviour, beliefs and experiences that influence your daily eating habits. I will ask you some questions about, for example, eating habits, eating out, and food and emotions. If there are any questions you don’t want to answer you do not have to. I would like to stress that there are no right or wrong answers we are really interested to hear how you are making your food choice decisions. I will tape record the interview so that I can remember all that has been said. I would also like to remind you that the contents of your interview will be kept confidential and that you are free to withdraw at any time. If at any time you wish to stop the interview you may either ask me to stop the tape or you may stop it yourself. Do you have any questions before we begin?

- Check that the interviewee is ready to start the interview.

This is a brief overview of the topic areas to be considered. It is likely that the content of the interview schedule will develop and may incorporate other areas as the researcher reflects upon each interview as it takes place. It is also likely that the order in which the topics are addressed may change according to the flow of the interview.

The prompts/explore sections in italics will be raised only if not covered spontaneously by participants.

Before commencing the topic guide a few factual questions will be asked in order to ease the participant into the interview. These will include asking their age, what year they are in at school and/or a favourite hobby/pastime.

Interview

Eating habits

1. You should have completed a short worksheet when you arrived today. Would you like to tell me hat you have eaten the previous day? Can you tell why you have
chosen those foods and not others? What was the situation like when you had these foods? What made you decide to choose that food? Are some factors deciding to choose that food particularly strong? E.g. taste, when you are hungry? Does this change from one time to the other?

1. Can you tell me what foods you normally eat? Which foods do you particularly like? Why? What is your favourite food? Are there foods you don’t like? Why do you think you don’t like them? Do you consider yourself picky?

2. Can you think of a situation where you are having foods which you normally don’t eat? E.g. Birthday, What would you eat? Do you eat different foods in summer and winter?

3. Do you have different eating habits on the weekends? How does your diet differ between weekdays and weekend? Describe it a little bit.

4. What do you eat at school? Do you bring your own lunch or do you get school meals? What is it like?

5. Are you having your breakfast/lunch/dinner always at a table? Or do you sometimes eat in front of the TV or computer?

Eating out

1. Sometimes it is not possible to have a meal at home. Can you tell me about your eating out habits? How often do you go out to eat at restaurants?

2. What places do you go to? How do you decide where to go when you want to eat out? Who do you go out with? Do you like it?

3. Do you eat fast foods? If so, why do you like it?

Travelling

1. Does your eating behaviour change when you are travelling? What foods do you eat when you are on holiday? Tell me a little bit about it. Is it difficult to find foods you like when you are abroad? Do you bring foods from home?

Food, family and community

1. Eating is considered to be a social thing. Do you think people you are eating with influence you?

2. How important is food and eating in the family? How often does the family eat together? What meals are family meals, and when do they occur? Why or why not? Is each family member having the same foods? Can you describe it a little bit?

3. How much control do your parents have over your eating habits? How much do they influence what you are eating? Which meals?

4. We know that many teens don’t eat meals together with their families. Why is this?

5. What do you choose to eat when you are with friends? When you are going to their house? Do you eat similar foods?

6. What would be served at a party?

Food preparation and shopping

1. Do you know how to cook or prepare foods? Do you sometimes do it? What meal would it be?

2. Do you sometimes buy foods yourself? E.g. from vending machines, supermarket?
Food and emotions

2. Sometimes what we eat is influenced by our feelings. Can you tell me any experience of how your mood has influenced the eating habits? How?

3. What foods are eaten when you feel good? What foods are eaten when you feel bad? Is there any comfort food? Do you treat yourself with foods? Which foods?

4. Are your snacks influenced your moods? If so, how? In which situations do you snack?

5. Do you sometimes find yourself eating particular foods when you are stressed, bored or depressed? Can you describe it little bit? Which foods do you in these situations

Ethnicity, religion, culture

1. People are different. Our ethnicity, religion, or family traditions may influence what we eat. Do these things influence what you eat? If so, how?

2. Do you have a friend coming from a different ethnical background? Are you aware of any cultural differences when it comes to food?

Food and health beliefs

1. A number of people try to follow a healthy diet. What is your understanding of a healthy diet? Would you like to tell me if or how important it is for you to eat healthy foods? Are there any foods that do and do not go together? Are there any things that are bad to eat? What foods are good to eat? Which foods do you consider as being healthy? Which are unhealthy?

2. Where do you get the information from? E.g. TV, school, …

3. What are the advantages and disadvantages of eating a healthy diet?

4. What are the barriers to eating a healthy diet? Does anybody eat healthier when eating with the family?

Development of food preferences

1. Think about changes you have made in what you eat over the last few years? Are you eating different foods now? Describe a little bit what you were eating when you were younger.

2. What triggered that change? What brought it about?

(Food Allergy – if not already mentioned)

1. You are here because you have a food allergy. At what age did you consciously become aware of your allergy? Would you like to tell me what difficulties you have when it comes eating food? Do you know how the foods you are allergic to taste like?

2. Do all of you read the label? How often? If not, why? Do you sometimes eat foods without looking at the package?

3. Do you ever eat food that might contain some allergen? If so, why

4. Do you ever eat the foods you are allergic to?

5. Are you sometimes jealous about your friends who can eat everything?
6. Do you tell people about your allergy? Who knows that you are allergic? Did you ever come across people who didn’t understand the seriousness of your allergy?

7. What was the most difficult adjustment that was made because of the food allergy? Did you ever have to make a conscious decision to change something in your diet? What would make your life as a food allergic person easier?

8. Are there any barriers when eating out in restaurants? If yes, which? Do you always ask the waiter about the ingredients?

“Is there anything else about how you are choosing your food that we have not mentioned that you would like to talk about?”

- Stop the tape
- Thank the participant for their help

“Thank you very much for your participation in this interview. It has been really interesting to hear about how you are making your food choices. Your contribution will be very helpful to my project. I will now make a written version of our interview and will send this to you to ask if there are any parts that you would like to change. In the meantime if you have any questions please feel free to ask me. Thanks again for your help.”

- Give £10 gift voucher
Appendix 5.1 - Information sheet children: food choice behaviour study

Information sheet for Children (4-8 years)

Hi, my name is Isolde and I work at the University of Portsmouth. I would like to find out more about how you decide which food you are choosing to eat. I am asking for your help in my study because I know you are either diagnosed with a food allergy OR you are likely to have a food allergy OR you do not suffer from any food allergy at all. Would you like to come and play a small game together with your mum or dad? It will only last about half an hour.

If you do come and it’s okay, I would like to video-tape you while you are playing that game. Later on I will watch that tape. When I watch the tape of you and your mum or dad playing the game, I use this to write up a report. I will not use your name and no one will know what you did and said in the game.

Remember, its okay not to come if you don’t want to. If you do say you want to come and then change your mind that’s okay too. No one will be upset in any way.

If you are not sure about anything ask your mum or dad. I would be happy to come and tell you more. If you think you would like to come then please write your name on this paper or just tell your mum or dad. Then I will let you know when the game is. Thank you.

Isolde

Name: ___________________________________ Date:__________________________
CONSENT FORM

Title of Project: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic children

Name of Researcher: Miss Isolde Sommer

Please initial box

1. I confirm that I have read and understand the information sheet dated ......................... (version ............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my and my son’s/daughter’s participation is voluntary and that I, and my son or daughter are free to withdraw at any time and without giving any reason.

3. I give my permission for the play to be video-recorded. This video will not be presented at any conference without my special permission.

4. I agree to my son/daughter and me taking part in the study.

_________________________ ____________________________________
Name of son/daughter Date Signature

_________________________ ________________________________
Your name Date Signature

_________________________ ________________________________
Researcher’s name Date Signature

I am happy for you to contact me on the following number/s:

Home………………………………………………………. [ ]

Work………………………………………………………. [ ]
Dear Parent/Legal guardian(s),

Re: An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic children

I would like to invite you and your son/daughter to join a new study that I will be conducting. The study is about food allergic, suspected-food allergic and non-allergic children, and how they make their food choice decisions.

Although a lot of research has been done with diagnosed or suspected food allergic children, there is little in-depth knowledge about how a diagnosed or suspected food allergy is influencing the food choice behaviour of children and how these areas can be targeted to better help children. A lot more is known about food allergy and quality of life in children. Because of these studies we know that these children’s lives are affected and may differ to those of other children. So it is a very important area of work to look at to find out how children’s food choice behaviour is influenced by their allergic condition. Non-food allergic children will contribute to this study by providing information on how food allergic children show a different food choice behaviour compared to non-food allergic children.

Therefore, I would like you and your son/daughter to play a small game on food choice behaviour. By observing you I am hoping to get a lot of information about your son’s/daughter’s food choice behaviour and your role in it.

If you and your son/daughter are interested in participating in the study please take time to read the enclosed information sheet. If you both decide to participate then please sign the enclosed consent form and complete the enclosed questionnaire. Please then return these to me in the enclosed envelope. Participants will receive a £10 gift voucher to thank them for their time.

If you have any questions at all or would just like more information, then please do not hesitate to contact me at the above address or telephone number. If you ring and I am not in
Appendix 3.1

please leave a message and I will return your call as soon as possible. Thank you for taking the time to read this.

Yours sincerely

Isolde Sommer

PhD Student
School of Health Sciences and Social Work
University of Portsmouth
An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic children

Information sheet

Dear Parent/Legal guardian(s)

I would like to invite you and your son/daughter to take part in a research study I am conducting. Before you decide whether you would like to participate, it is essential for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends, relatives and your GP if you wish. Please ask me if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

The purpose of the study is to find out what attitudes, behaviours, beliefs and experiences influence the food choice of children who have been diagnosed with a food allergy, children who are likely to suffer from a food allergy, and children who are not allergic to foods at all. I further would like to compare the food choice behaviour between these three different groups to be able to understand if and to what extent food allergy affects the food choice behaviour of food allergic children.

Why have you and your son/daughter been chosen?

You have been chosen because your son/daughter either has been diagnosed with a food allergy OR he/she is likely to have a food allergy, but has not been diagnosed yet OR he/she does not suffer from any food allergy at all. You and your son/daughter are therefore valuable to help me answer the research question.

Do we have to take part?
Appendix 3.2

No. It is up to you and your son/daughter to decide whether or not to take part. If you decide to take part I suggest you keep this information sheet. I will also ask you to complete and sign the enclosed consent form. However, if you decide to take part you are still free to withdraw at any time before, during and after the study and without giving a reason.

How is the study conducted?

This study is a qualitative study. This means that I need to collect as much information as possible about what attitudes, behaviour, beliefs and experiences influence the food choice of allergic, suspected-allergic, and non-allergic children. The more you are able to share with me the more accurate a picture I can develop about the food choice behaviour of these groups.

What will happen if we decide to take part?

If you decide to take part in the study I would like to invite you and your son/daughter to play a board game. You will be given a problem-solving task related to food choice behavior, which you have to solve together. Prior to playing, you and your son/daughter will be instructed on how to play the game. If your son/daughter has a diagnosed or suspected-food allergy you are asked to take into account their allergic condition. The play will last up to 30 minutes.

Although I do not anticipate you or your son/daughter being uncomfortable, you will be under no obligation to finish the game if you become uncomfortable. I would like to videotape you while you are playing the game so that I can remember what happened later. This videotape will be used for analysis.

What are the benefits of taking part?

You and your son/daughter would not personally benefit from participating in the study. However, I hope that this study will lead to a better understanding on what influences the dietary pattern of food-allergic, suspected-food allergic, and non-food allergic children.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks to you and your son/daughter in taking part in this study, although it will involve giving up around an hour of your time.

Will my taking part in the study be kept confidential?

Yes. All information collected during the course of the research will be kept strictly confidential. Each participant will receive a code when analysing the videotape. The videotape will be kept safe in a locked cabinet with me being the only person who can open it. The tape will be destroyed within 3 years time. You and your son/daughter will not be identified in any reports or publications resulting from this study. In case I plan to present the video showing you and your son/daughter at a conference, I will ask you for special permission.
Appendix 3.2

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented orally to conferences and individuals and organizations with an interest in them. I will also summarise my findings in a brief report to all participants.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. People of the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight are involved in the study.

Who has reviewed the study?

The study has been reviewed by the Southampton and South West Hampshire Research Ethics Committee A.

What should we do next?

If you are interested in joining the study please both sign the enclosed consent form. Please then return this consent form to me in the enclosed envelope. I will then contact you to offer you a date and place that is convenient for you. To help me do this and if you are happy to, could you please also write your phone number on the consent form.

If you have any questions at all then please contact me in any ways given above and I will be happy to speak to you.

Thank you for your time.

Isolde Sommer
PhD Student
Appendix 3: Screening questionnaire

An investigation of food choice behaviour of food allergic, suspected-food allergic, and non-food allergic children

Age: ………..years

Gender: Female ☐ Male ☐

Is your child diagnosed with food allergy? Yes ☐ No ☐

How was your child diagnosed with food allergy?
Skin prick test ☐ Blood test ☐ Other ☐
Doctor’s diagnosis ☐ Food challenge ☐

If you ticked Other please tell me what it is ……………………………

What foods is your child allergic to?
Egg ☐ Milk ☐ Peanuts ☐ Tree nuts ☐
Sesame ☐ Crustaceans ☐ Fish ☐ Wheat ☐
Others……………

Do you believe that your child has a food allergy, but he/she is not diagnosed yet?
Yes ☐ No ☐

If yes, why? ……………………………………………………………………………………………
If yes, what symptoms does he/she have?……………………………………………………

Does your child avoid food for other reasons than dislike?
Healthy diet ☐ Food intolerance ☐ Suspected food allergy ☐
Makes him/her feel ill ☐ Others ☐

If Makes him/her feel ill, why? …………………………………………………………………
If Others, which? …………………………………………………………………………………

Version 1 11th of March 2010 LREC No: 10/H0502/26
Appendix 3: Screening questionnaire

What type of diet is your child following?

- Normal (eats meat and food from plants)
- Vegetarian (no meat)
- Vegan (eats only food from plant sources)

Does your child have any diseases affecting the diet, e.g. diabetes?  
Yes  No

If yes, which? .................................................................

Does your child have any other condition affecting the diet?  
Yes  No

If yes, which? .................................................................

Ethnicity:
- White British
- White European
- White Other
- Black: British Caribbean
- Black: British African
- Black: British other
- Asian: British Indian
- Asian: British Other
- Mixed Background
- Chinese
- Other  

Highest qualification of father: ....................

Highest qualification of mother: ....................

Occupation of father: ....................

Occupation of mother: ....................

Family size (number of individuals living at home): ............

Thank you for completing this questionnaire!
How do you choose your food?
Volunteers sought for a research study

The School of Health Sciences and Social Work at University of Portsmouth is conducting a research study on food choice behaviour of children. Children will be asked to play a game with their mum or dad. Place and time will be arranged convenient to the participants.

Eligibility criteria:

• You are aged 4-8
• You have a confirmed diagnosis of egg, milk, peanuts, tree nuts, sesame, crustaceans, fish, or wheat allergy
• And you do not have any other illnesses affecting your food choice (e.g. diabetes)

Participants will receive a £10 gift voucher

If you have a child with food allergy, please contact:
Isolde Sommer
PhD student
Tel: (0)23 92844434
e-mail: isolde.sommer@port.ac.uk
RESPONSIVE/CHILD ORIENTED

1. **SENSITIVITY TO CHILD'S INTEREST.**
   This item examines the extent to which the parent seems aware of and understands the child's activity or play interests. This item is assessed by the parent's engaging in the child's choice of activity, parent's verbal comments in reference to child's interest and parent's visual monitoring of child's behavior or activity. Parents may be sensitive but not responsive - such as in situations where they describe the child's interests but do not follow or support them.

   **Rating of [1]:** Highly insensitive. Parent appears to ignore child's show of interest. Parent rarely watches or comments on child's behavior and does not engage in child's choice of activity.

   **Rating of [2]:** Low sensitivity. Parent occasionally shows interest in the child's behavior or activity. Parent may suddenly notice where child is looking or what child is touching but does not continue to monitor child's behavior or engage in activity.

   **Rating of [3]:** Moderate sensitivity. Parent seems to be aware of the child's interests; consistently monitors child's behavior but ignores more subtle and hard-to-detect communications from the child.

   **Rating of [4]:** High sensitivity. Parent seems to be aware of the child's interests; consistently monitors the child's behavior but is inconsistent in detecting more subtle and hard-to-detect communications from the child.

   **Rating of [5]:** Very high sensitivity. Parent seems to be aware of the child's interests; The parent positions herself so that she can make face to face contact with the child. The parent consistently monitors the child's behavior and follows interest indicated by subtle and hard-to-detect communications from the child.
2. RESPONSIVITY.
This item rates the frequency, consistency and supportiveness of the parent's responses to the child's behaviors. Responses are supportive when they match the child's actions, requests and intentions. Responsivity is assessed in relation to child behaviors that both demand a response from adults as well as non-demand behaviors that may not be directed toward the adult. Child behaviors include play and social activity as well as facial expressions, vocalizations, gestures, signs of discomfort, body language, requests and intentions.

Rating of [1]: Highly unresponsive. Parent responds infrequently to the child and usually only to behaviors that demand a response. Less than 10% of the time the parent reacts to the child's play and social activities, facial expressions, vocalizations, gestures, body language, and intentions that do not demand a response.

Rating of [2]: Unresponsive. Parents respond to most of the child's demand behaviors but to less than one fourth of the child's non-demand behaviors and intentions. The parents' responses may be non-supportive insofar as they stop the child's activity or redirect the child to do something different than what they were intending to do. They may also be mismatched to the child's behavior such as when parents label or comment on the child's activity but do physically react to the what the child is doing.

Rating of [3]: Consistently responsive. Parents respond to almost all of the child's demand behaviors and to at least one fourth of the child's non-demand behaviors and intentions. Most of the parent's responses are supportive insofar as they encourage the child's activity. At least one half of the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if the child is playing the parent responds with actions to the child's activity; if the child is vocalizing or communicating the parent responds by vocalizing or communicating.

Rating of [4]: Responsive. Parents respond to almost all of the child's demand behaviors and to about one half of the child's non-demand behaviors and intentions. Most of the parent's responses are supportive insofar as they encourage the child's activity. Most of the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if the child is playing the parent responds with actions to the child's activity; if the child is vocalizing or communicating the parent responds by vocalizing or communicating.

Rating of [5]: Highly responsive. Parents respond to almost all of the child's demand behaviors and to most of the child's non-demand behaviors and intentions including subtle and hard to detect gestures, vocalizations and other behaviors. The parent's responses are almost always supportive insofar as they encourage the child's activity. The majority of the parent's responses match the child's behavior such that the parent's responses are directly related to what the child is doing. For example, if the child is playing the parent responds with actions to the child's activity; if the child is vocalizing or communicating the parent responds by vocalizing or communicating.

3. EFFECTIVENESS (RECIPROCITY). 
This item refers to the parent's ability to engage the child in the play interaction. It determines the extent to which the parent is able to gain the child's attention, cooperation and participation in a reciprocal exchange characterized by balanced turn-taking in play or conversation.
Rating of [1]: **Very ineffective.** Parent is seldom engaged in any kind of joint or cooperative activity or communication with the child. The child may be actively engaged and may even be in close proximity to the parent, but the parent is usually not joining in what the child is doing. The parent may attempt to elicit the child's cooperation, but the child either does not respond, or responds briefly and quickly disengages. Parent may give the appearance of helplessness where the child is concerned.

Rating of [2]: **Ineffective.** Parent is mostly ineffective in keeping the child engaged in joint or cooperative activity or communication. The child may be actively engaged and may even be in close proximity to the parent, but the parent is only occasionally successful at cooperating or participating with what the child is doing. In the few instances when the parent gains the child's cooperation, the interaction tends to last little more than two or three turns before the child disengages. In such instances, the child may continue the activity without noticing or responding to the parent.

Rating of [3]: **Moderately effective.** At least one third of the time parent is successful in engaging the child in a joint activity or communication. Interactive sequences seldom last more than 3 to 5 turns before the child disengages, but such interactive sequences occur frequently during the observation. Interactive sequences may be dominated by either the parent or the child and are generally not characterized by a balanced reciprocal exchange of turns.

Rating of [4]: **Highly effective.** More than one half of the time parent is successful in engaging the child in a joint activity or communication. Interactive sequences generally last ten or more turns at a time. With little prompting the parent is successful at encouraging the child to transition into this pattern of interaction. The majority of interactive sequences are characterized by a balanced, reciprocal exchange of interactive turns.

Rating of [5]: **Extremely effective.** Parent is able to keep the child willingly engaged in joint activity or communication throughout the majority of the interaction. Interactive sequences generally last a few minutes at a time before the parent or child disengages. Interactive sequences are almost always characterized by a balanced, reciprocal exchange of turns.
Maternal Behavior Rating Scale

AFFECT/ANIMATION

1. ACCEPTANCE
This item assesses the extent to which the parent's behaviors and communications accept or affirm the child and what the child is doing. Acceptance can range from rejection, to no or few signs of approval, to a more active affirmation as reflected in interactions that indicate that the child's behaviors and communications are legitimate, good or worthy. Acceptance is measured primarily in terms of how parent's nonverbal and verbal behavior accept and affirm the child for who he or she is or what he or she is currently doing rather than for meeting the parent's requests or expectations.

Rating of [1]: Rejecting. Parent primarily interacts with the child by trying to get the child say or do things that the child does not appear capable of doing at the moment. Parent may express dissatisfaction with what the child is doing, and almost never takes delight in or encourages the child to communicate or play the way the child is able to do.

Rating of [2]: Low acceptance. Parent puts little pressure on the child to say or do things he is not yet able to do. However, parent shows little positive affect toward the child. Parent mostly remains neutral and almost never takes delight in or encourages the child to communicate or play the way the child is able to do.

Rating of [3]: Accepting. Parent expresses a general positive affect toward the child and occasionally expresses delight in child's actions or communications. While the parent affirms the child by frequently responding in a way that supports the child's actions or intentions, the parent also requests or prompts the child to do or say things that the child is unable to do.

Rating of [4]: Very accepting. Parent expresses enthusiasm and delight for the child's actions and communications. More than one half of the time, the parent's interacts in a way that affirms the child's actions and communications as legitimate and worthwhile. The parent may make a few suggestions or requests, but these are generally made to help the child communicate or do what they want more effectively.

Rating of [5]: High acceptance. Parent is effusive with delight and admiration of the child. Parent expresses intense positive affect in response to the child's actions and communications in a way that continually affirms the child as legitimate and worthwhile. The parent's suggestions or requests almost always support the child's actions and communications.

2. ENJOYMENT.
This item assesses the parent's enjoyment of interacting with the child. Enjoyment is experienced and expressed in response to the child himself -- his spontaneous expressions or reactions, or his behavior when interacting with his parent. There is enjoyment in child's being himself rather than the activity the child is pursuing.

Rating of [1]: Enjoyment is absent. Parent may appear rejecting of the child as a person.

Rating of [2]: Enjoyment is seldom manifested. Parent may be characterized by a certain woodenness. Parent does not seem to enjoy the child per se.
Rating of [3]: Pervasive enjoyment but low-intensity. Occasionally manifests delight in child being himself.

Rating of [4]: Enjoyment is the highlight of the interaction. Enjoyment occurs in the context of a warm relaxed atmosphere. Parent manifests delight fairly frequently.

Rating of [5]: High enjoyment. Parent is noted for the buoyancy and display of joy, pleasure, delighted surprise at the child's unexpected mastery.

3. **EXPRESSIONIVENESS.**
This item measures the tendency of the caregiver to communicate and react emotionally toward the child. It assesses both the frequency of the parent's verbal and nonverbal communications as well as the intensity and animation of these communications.

Rating of [1]: Highly inexpressive. Parent may be characterized as quiet and uncommunicative during the interaction. When the parent speaks, affect is flat; voice quality is dull and facial expressions vary little.

Rating of [2]: Low overt expressiveness. Parent communicates occasionally during the interaction. Parent’s body language, affect, voice quality and facial expression may be characterized as dull to neutral.

Rating of [3]: Moderate overt expressiveness. Parent communicates consistently during the interaction. Parent’s body language, affect, voice quality and facial expression may be characterized as ranging from neutral to mildly positive.

Rating of [4]: Overtly expressive. Parent communicates consistently during the interaction. Parent uses body language, voice quality and facial expression in an animated manner to express emotion toward the child. Parent is generally enthusiastic but not extreme in expressiveness.

Rating of [5]: Highly expressive. Parent communicates consistently during the interaction. Parent is extreme in expression of all emotions using body language, facial expression and voice quality. Appears very animated, these parents are "gushers."

4. **INVENTIVENESS.**
This item assesses the range of stimulation parents provide their child; the number of different approaches and types of interactions and the ability to find different things to interest the child, different ways of using toys, combining the toys and inventing games with or without toys. Inventiveness is both directed toward and effective in maintaining the child's involvement in the situation. Inventiveness does not refer merely to a number of different, random behaviors, but rather to a variety of behaviors which are grouped together and directed towards the child.

Rating of [1]: Very small repertoire. Parent is unable to do almost anything with the child, parent seems at a loss for ideas, stumbles around, is unsure of what to do. Parent's actions are simple, stereotyped and repetitive.

Rating of [2]: Small repertoire. Parent does find a few ways to engage the child in the course of the situation, but these are of limited number and tend to be repeated
frequently, possibly with long periods of inactivity. Parent uses the toys in some of the standard ways, but does not seem to use other possibilities with toys or free play.

**Rating of [3]: Medium repertoire.** Parent performs the normal playing behaviors of parenthood, shows ability to use the standard means of playing with toys, and the usual means of free play. Parent shows some innovativeness in play and use of toys.

**Rating of [4]: Large repertoire.** Parent shows ability to use all the usual playing behaviors of parenthood, but in addition is able to find uses which are especially appropriate to the situation and the child’s momentary needs.

**Rating of [5]: Very large repertoire.** Parent consistently finds new ways to use toys and/or actions to play with the child. Parent shows both standard uses of toys as well as many unusual but appropriate uses, and is continually able to change his/her behavior in response to the child’s needs and state.

5. **WARMTH.**

This item rates the demonstration of warmth to a child which is positive attitude revealed to the child through pats, lap-holding, caresses, kisses, hugs, tone of voice, and verbal endearments. Both the overt behavior of the parent and the quality of fondness conveyed are included in this rating. It examines positive affective expression; the frequency and quality of expression of positive feelings by the parent and the parent’s show of affection.

**Rating of [1]: Very low.** Positive affect is lacking. Parent appears cold and reserved, rarely expresses affection through touch, voice.

**Rating of [2]: Low.** Parent occasionally expresses warmth through brief touches and vocal tone suggests low intensity of positive affect.

**Rating of [3]: Moderate.** Pervasive low-intensity positive affect is demonstrated throughout the interaction. Fondness is conveyed through touch and vocal tones.

**Rating of [4]: High.** Affection is expressed frequently through touch and vocal tone. Parent may verbalize terms of endearment.

**Rating of [5]: Very high.** Parent openly expresses love for the child continually and effusively through touch, vocal tone and verbal endearments.
Maternal Behavior Rating Scale

ACHIEVEMENT ORIENTATION

1. ACHIEVEMENT.
This item is concerned with the parent's encouragement of sensorimotor and cognitive achievement. This item assesses the amount of stimulation by the parent, which is overtly oriented toward promoting the child's developmental progress. This item assesses the extent to which the parent fosters sensorimotor and cognitive development whether through play, instruction, training, or sensory stimulation and includes the energy which the parent exerts in striving to encourage the child's development.

Rating of [1]: Very little encouragement. Parent makes no attempt or effort to get child to learn.

Rating of [2]: Little encouragement. Parent makes a few mild attempts at fostering sensorimotor development in the child but the interaction is more oriented to play for the sake of playing rather than teaching.

Rating of [3]: Moderate encouragement. Parent continually encourages sensorimotor development of the child either through play or training but does not pressure the child to achieve.

Rating of [4]: Considerable encouragement. Parent exerts some pressure on the child toward sensorimotor achievement, whether as unilateral pressure or in a pleasurable interactional way and whether wittingly or unwittingly.

Rating of [5]: Very high encouragement. Parent exerts much pressure on the child to achieve. Parent constantly stimulates him toward sensorimotor development, whether through play or obvious training. It is obvious to the observer that it is very important to the parent that the child achieve certain skills.

2. PRAISE (VERBAL)
This scale assesses how much verbal praise is given to the child. Examples of verbal praise are "good boy," "that's a girl," "good job." Praise in the form of smiles, claps or other expressions of approval are not included unless accompanied by a verbal praise. Praise may be given for compliance, achievement or for the child being himself.

Rating of [1]: Very low praise. Verbal praise is not used by the parents in the interaction even in situations which would normally elicit praise from the parent.

Rating of [2]: Low praise. Parent uses verbal praise infrequently throughout the interaction.

Rating of [3]: Moderate praise. Parent uses an average amount of verbal praise during the interaction. Parent praises in most situations which would normally elicit praise.

Rating of [4]: Praises frequently. Parent verbally praises the child frequently for behavior which would not normally elicit praise.

Rating of [5]: Very high praise. Very high frequency of verbal praise from the parent even for behavior which would not normally elicit praise.
Maternal Behavior Rating Scale

DIRECTIVE

1. DIRECTIVENESS
This item measures the frequency and intensity in which the parent requests, commands, hints or attempts in other manners to direct the child's immediate behavior.

**Rating of [1]: Very low directive.** Parent allows child to initiate or continue activities of his own choosing without interfering. Parent consistently avoids volunteering suggestions and tends to withhold them when they are requested or when they are the obvious reaction to the immediate situation. Parent's attitude may be "do it your own way."

**Rating of [2]: Low directive.** Parent occasionally makes suggestions. This parent rarely tells the child what to do. He/she may respond with advice and criticism when help is requested but in general refrains from initiating such interaction. On the whole, this parent is cooperative and non-interfering.

**Rating of [3]: Moderately directive.** The parent's tendency to make suggestions and direct the child is about equal to the tendency to allow the child self-direction. The parent may try to influence the child's choice of activity but allow him independence in the execution of his play, or he may let the child make his own choice but be ready with suggestions for effective implementation.

**Rating of [4]: Very directive.** Parent occasionally withholds suggestions but more often indicates what to do next or how to do it. Parent produces a steady stream of suggestive remarks and may initiate a new activity when there has been no previous sign of inertia and/or resistance shown by the child.

**Rating of [5]: Extremely directive.** Parent continually attempts to direct the minute details of the child's "free" play. This parent is conspicuous for the extreme frequency of interruption of the child's activity-in-progress, so that the parent seems "at" the child most of the time -- instructing, training, eliciting, directing, controlling.

2. PACE.
This item examines the parent's rate of behavior. The parent's pace is assessed apart from the child's; it is not rated by assessing the extent to which it matches the child's pace but as it appears separately from the child.

**Rating of [1]: Very slow.** Parent is almost inactive. Pace is very slow with long periods of inactivity.

**Rating of [2]: Slow.** Parent's overall tempo is slower than average. There may be inconsistency in the parents' tempo in which periods of inactivity are followed by occasions of active participation.

**Rating of [3]: Average pace.** This parent is neither strikingly slow nor fast. Tempo appears average compared to other parents.

**Rating of [4]: Fast.** Parent's overall tempo is faster than average. There may be few brief periods of inactivity, that re followed by quick paced activity.
Maternal Behavior Rating Scale

Rating of [5]: Very fast. Parent's interactive tempo could be characterized as rapid fire behavior. The pace of the parent's interactive tempo may not allow the child time to react.
CHILD BEHAVIOR RATING SCALE (Revised, 1998)
Gerald Mahoney

Note: The Child Behavior Rating Scale has been reported in two published studies examining the influence of teachers' interactive style on the engagement of preschool-aged children with disabilities (Mahoney & Wheeden, 1998; 1999). Results from these studies indicated that the interactive behaviors measured by this scale are influenced by the way adults interact with children. These behaviors appear to be critical dimensions of children's active learning insofar as they are also related to children's level of developmental functioning. Factor analyses of these seven items indicate they measures two components of interactive behavior - Attention and Initiation. The following items have been arranged according to the scales they are associated with.

ATTENTION

1. ATTENTION TO ACTIVITY: (Flittiness/Stay-It-Ness).
   This scale assesses the extent to which the child attends to activities. While the child may or may not be actively involved in the activity, the child rated as demonstrating high attention remains in the activity for an extended duration. The quality of the child's participation may be characterized as highly involved or uninvolved. In other words, the child may or may not appear to derive satisfaction from the activities. A child rated as low in attention may briefly participate in an activity and then physically remove herself or engage briefly in another activity. A child receiving a low rating in attention may frequently change or avoid activities, never seeming to attend to an activity for more than a few seconds at one time.

   Rating of [1]: Very Low - The child never attends to a computer activity to more than a few seconds at a time. He or she may be completely inactive, avoidant of the activities, or may constantly change activities.

   Rating of [2]: Low - The child can be described as generally inattentive for the activity. Although the child sometimes participates in the activity, she is more often inactive, avoidant of the activities, or engaged in changing activities.

   Rating of [3]: Moderate - The child attends to the activities about as often as she does not. She has extended periods of time in which she participates in the activity as well as periods in which she is engaged in avoiding or changing activities.

   Rating of [4]: High - The child "stays with" the activities during the majority of the session. She may have periods in which she is inattentive but these are short-lived and limited in number.

   Rating of [5]: Very High - The child "stays with" the activities throughout the session. The child participates in the activities without periods of inattention.

2. PERSISTENCE: (Practice/Problem Solving).
   This scale measures the degree to which the child makes an effort to participate in activities. A child scoring high on persistence, makes several attempts at tasks when playing with the adult and continues to try solutions even though he may not successfully reach his or the adult's goal. Persistence also reflects the extent to which the child practices actions and vocalizations. A
child receiving a high score may frequently perform the same action on same or different objects or practice vocalizations over and over again (imitate the adult or the computer’s sounds/words). A child scoring low on the scale makes little effort to participate in the activities. He or she rarely practices behaviors or vocalizations and when encountering difficulty during an activity quickly gives up. Persistence is distinguished from compliance by being child-initiated as opposed to adult-initiated. In other words, if the child attempts to participate in an activity solely in response to the adult’s request, this will be seen as compliance rather than persistence.

Rating of [1]: Very Low - The child never demonstrates repetition of a behavior. The child who is very low in persistence may never attempt a second try when having difficulty.

Rating of [2]: Low - The child infrequently demonstrates repetition of a behavior. She may occasionally make a second attempt when having difficulty but quickly gives up.

Rating of [3]: Moderate - The child has extended periods in which he or she seems to be practicing behaviors, but just as often has periods in which he does not practice. Similarly, there may be periods in which the child continues to try when having difficulty about as often as there are periods in which she quickly gives up.

Rating of [4]: High - Although the child has some periods in which she quickly gives up or during which repetition of behavior is rarely seen, in general, the child can be describe as high in persistence. She is often observed to practice behaviors or make second and third attempts when having difficulty.

Rating of [5]: Very High - The child frequently practices vocalizations or activities. He also may make repeated attempts at tasks when having difficulty. The child's persistence is a highlight of his behavior throughout the session.

3. INVOLVEMENT: (DISTRACTIBILITY - Looking Around).

This scale reflects the intensity with which the child is involved in the activity. The child who is high in involvement is actively involved throughout the majority of the activity. This child appears to be highly motivated to engage in the activities regardless of whether they are adult or child initiated. He or she is intent on participating in the activities and seems to derive satisfaction from the activities. The child who is low in involvement is either passively involved during the activity, attempts to avoid participation, or is highly distractible during the activity. This child may “stay” with the activity but seems to derive little satisfaction from his or her involvement. This child may frequently look at the camera or leave the area.

Rating of [1]: Very Low - This child obviously does not derive satisfaction from his involvement in the activities. The child shows a great deal of neutral affect as well as some distress or avoidance of the activity. When the child does participate in the interaction, he seems to be “going through the motions” rather than actively participating. This child may be greatly distracted by other activities in the classroom.

Rating of [2]: Low - This child, for the most part, does not derive satisfaction from his participation in the activities. He may show largely neutral affect and may appear passive during the interaction. His behavior may appear to be largely “rote” during the activities. Or this child may subtly or overtly demonstrate uninvolved by being distracted during the majority of the session.

Rating of [3]: Moderate - The child derives some satisfaction from the activities. There are sustained periods in which he seems intent on what he is doing or uses gestures or vocalizations to express satisfaction with the activity. There are also extended periods in which the child seems to be “going through the motions” or is disinterested in the activities.
Rating of [4]: High - The child can be described as highly involved. During the majority of the session, the child appears to derive satisfaction from his participation in the activities.

Rating of [5]: Very High - The child is highly involved throughout the session. This child appears to be highly motivated to engage in the activities regardless of whether they are adult or child initiated. He or she derives a great deal of satisfaction from participating in the activities.

4. COMPLIANCE/COOPERATION: (Does Child Avoid at All?)
The degree to which the child attempts to comply with the requests or suggestions of the adult is measured using this scale. A child scoring high in compliance will make an effort to do what the adult asks or will respond quickly to the adult's subtle or overt suggestions. A child scoring low in compliance may refuse to cooperate with the adult. This child may actively avoid the activity by throwing materials or simply by ignoring the adult's suggestions and engaging in other activities.

Rating of [1]: Very Low - The child may overtly demonstrate refusal to cooperate by throwing or pushing away materials, or may simply ignore the adult's suggestions.

Rating of [2]: Low - While the child may occasionally attempt to cooperate with the adult's suggestions, the child is not cooperative for the majority of the interaction.

Rating of [3]: Moderate - The child attempts to cooperate with the adult's requests or suggestions about as often as he or she does not cooperate.

Rating of [4]: High - The child usually attempts to cooperate with the adult's requests or suggestions. He or she may occasionally refuse to cooperate but for the majority of the time attempts to follow the adult's suggestions or requests.

Rating of [5]: Very High - The child consistently attempts to cooperate with the adult's requests or suggestions. He or she responds quickly to both overt and subtle requests or suggestions.
INITIATION

1. INITIATION: ACTIVITIES.
This scale measures the extent to which the child initiates activities. A child who receives a high rating frequently attempts to initiate activities during the segment. (Examples of initiation: verbal initiation, start new game, change activities within game, ask for help. Child doesn’t wait for adult guidance. Initiation is NOT trying the same thing over and over, ignoring opportunities to try something new). A child scoring low on this scale rarely attempts to initiate activities and may respond only to the adult’s agenda rather than attempting to carry out her own agenda, or may appear uninterested in playing with the materials.

Rating of [1]: Very Low - The child almost never attempts to initiate activities. He or she may be extremely passive and inactive during the interaction or only engage in activities in response to the adult’s requests.
Rating of [2]: Low - The child occasionally attempts to initiate activities. For the most part, however, the child either follows the adult’s agenda or is very passive during the interaction.
Rating of [3]: Moderate - On several occasions the child attempts to initiate activities. There are also several periods in which the child is passive, uninvolved or responding only to the adult’s agenda.
Rating of [4]: High - The child consistently attempts to initiate activities. Although the child initiates regularly, the child occasionally becomes uninvolved or passive during the interaction.
Rating of [5]: Very High - The child initiates activities throughout the session. He clearly has his own agenda and insists on following it.

2. INITIATION: ADULT.
The extent to which the child initiates interaction with the adult is measured using this scale. The child receiving a high rating, has frequent and lengthy bouts of eye-contact and other sharing behaviors such as vocalizations. This child tries to engage the adult by taking turns, or by using vocalizations, gestures and facial expressions. (Vocalizations may include: “come here”, “your turn”, “look at this”). A child scoring low in attention to adult may rarely have eye contact or attempt to share experiences or engage the adult by showing or offering toys.

Rating of [1]: Very Low - The child never attempts to share experiences with the adult. He or she never engages in periods of eye-contact or vocalization or attempts to engage the adult by showing or offering toys.
Rating of [2]: Low - The child occasionally attends to the adult by demonstrating eye-contact. For the most part, however, the child does not attempt to share experiences with the adult.
Rating of [3]: Moderate - The child attends to the adult approximately half of the time. He or she demonstrates periods of eye-contact or other sharing behaviors, but equally demonstrates periods of inattention. This child may also have extended periods of eye contact but more in response to the adult’s behavior than in an attempt to engage the adult.
Rating of [4]: High - The child attends to the adult for the majority of the session. He or she is often observed to actively share experiences through eye-contact and vocalization and sometimes attempts to initiate activities with the adult.
Rating of [5]: Very High - The child has frequent and lengthy bouts of eye contact with
the adult. He or she often vocalizes while looking at the adult or attempts to share experiences by showing or offering toys or materials or otherwise initiating activities with the adult. The child is characterized by his frequent attempts to involve the adult.

3. **AFFECT.**
This scale reflects the child’s general emotional state during the interaction. A child receiving a high score overtly demonstrates positive affect and enjoyment whether it be directed toward the adult or activity itself. This child may frequently smile, laugh or vocalize with the adult or during the activity. A child scoring low on this scale frequently demonstrates anger or distress during the interaction. He may cry, attempt to hit the adult, or throw materials and toys.

**Rating of [1]: Very Low** - The child demonstrates a great deal of distress during the interaction. He or she may cry, whine, or attempt to hit the adult or throw materials and toys.

**Rating of [2]: Low** - While the child does not demonstrate distress throughout the interaction, there are several sustained periods in which the child is distressed.

**Rating of [3]: Moderate** - The child, in general, displays low intensity enjoyment. Or this child can be generally characterized as sober or neutral in affect.

**Rating of [4]: High** - For the most part, the child can be described as happy. He or she shows some neutral affect, but most often appears to be happy during the session.

**Rating of [5]: Very High** - The child often vocalizes, laughs or smiles when interacting with the toys or adult. He or she never demonstrates negative affect.
Appendix 6.1 - An investigation into dietary intake of children, teenagers and adults with food allergy: letter of ethical approval

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21 March 2011

Ms Isolde Sommer
PhD Student
University of Portsmouth
SHSSW
2 King Richard 1st Road
Portsmouth
PO1 2FR

Dear Ms Sommer

Study Title: An investigation of dietary patterns of food allergic consumers
REC reference number: 11/SC/0039

The Research Ethics Committee reviewed the above application at the meeting held on 08 March 2011. Thank you for attending to discuss the study.

Ethical opinion

The researchers, C1 - Ms Isolde Sommer and her colleague Heather, were invited to join the meeting and thanked for their attendance. At this point, Dr Chris Markham left the discussion.

- The Committee asked the researchers how they will make the approach to participants from previous studies to ask if they would like to be involved in this one. The researchers explained that these participants are well known in the department and it is known if they are happy to take part in future research. They stated that either a letter or a phone call will be made, and then clarified that most probably a letter will be posted out, to prevent the participants from feeling chased.
- The Committee noted that Ms Isolde Sommer has conducted similar surveys before, and wondered whether these included children in a home setting. The researcher explained that she has surveyed children in their homes several times before and that a parent has always been present. She went on to point out that although she is usually on her own, her colleagues know where she is and she always has a mobile phone with her.
- The Committee asked the researchers about the diet plan software - whether it is existing already or if it needs to be purchased. The researchers explained that although it needs to be purchased, part of the studies funding has been put aside for this. They described that is a standard piece of software that can be purchased by any dietician.

The researchers left the room. Dr Chris Markham rejoined the meeting.

The Committee concluded that it was happy with the responses and satisfied that the

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Appendix 6.1 - An investigation into dietary intake of children, teenagers and adults with food allergy: letter of ethical approval

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at [http://www.rdforum.nhs.uk](http://www.rdforum.nhs.uk).

Where the only involvement of the NHS organisation is as a Participant Identification Centre (PIC), management permission for research is not required but the R&D office should be notified of the study and agree to the organisation's involvement. Guidance on procedures for PICs is available in IRAS. Further advice should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

The Committee gave a favourable opinion of the application. The following conditions were agreed:

1. The Committee requests confirmation that the parents will always be present when surveys are conducted with children at their homes.
2. The Committee requires verification that the researchers will be carrying out their research with children at their homes according to safeguarding guidelines.
3. The Committee asks for the BJ10 and two exclamation marks to be removed from the sentence "Participants will receive a BJ10 gift voucher!!" on the advertisement.
4. The Committee strongly advises that the supporting documents, in particular the PIS’s and invitation letters, are proof read and spelling, punctuation and grammatical errors are corrected before circulating.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers.

Approved documents

The documents reviewed and approved at the meeting were:

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Appendix 6.1 - An investigation into dietary intake of children, teenagers and adults with food allergy: letter of ethical approval

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This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority

The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England
Appendix 6.1 - An investigation into dietary intake of children, teenagers and adults with food allergy: letter of ethical approval

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Dr Chris Markham declared that knows the CI, Ms Isolde Sommer, although he is not involved in the study in any way. It was agreed that Dr Markham would remain in the room for the Committee's discussion, but would leave the room while the researchers are present.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

[11/SC/0039] Please quote this number on all correspondence

With the Committee's best wishes for the success of this project

Yours sincerely

[Signature]

Dr Iain MacIntosh
Chair

Email: scsha.swhreca@nhs.net

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments

"After ethical review – guidance for researchers"

This Research Ethics Committee is an advisory committee to South Central Strategic Health Authority

The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England
Dear Participant,

Re: An investigation of dietary patterns of food allergic consumers

I would like to invite you to join a new study that I will be conducting. The study is about food allergic consumers and how they manage their diet. I would like to compare the diet of adults with food allergies to those without.

Although a lot of research has been done with food allergic consumers, there is little in-depth knowledge about how a food allergy influences diet and how care can be targeted to better tailor their dietary management. Previous research has focussed on the impact of food allergy on quality of life and indeed, research suggests that food allergic consumers have a reduced quality of life compared to non-food allergic. However, little is known about if and to what extent food allergy affects the diet of food allergic consumers.

Therefore, I would like to collect information about what you have had to eat and drink over several days. Everyone taking part in this dietary survey will be asked to complete a questionnaire about his diet and food allergy if applicable, and to keep a food and drink diary over 4 days. We would arrange a time and place that is convenient to you so that I can explain you the recording procedure. Detailed instructions on estimating and recording will also be provided in an instruction manual demonstrating the information. Additionally, I would phone you during the 4-days of recording to check whether you have any questions or you are experiencing any difficulties. I would meet with you after four days again to collect and review the food diary.

Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their time.

If you are interested in participating in the study please take time to read the enclosed information sheet. If you decide to participate then please sign and return the enclosed consent form. If you have any questions at all or would just like more information, then please do not hesitate to contact me at the address or telephone number above. If you ring and I am not in please leave a message and I will return your call as soon as possible.
Invitation letter adults

Thank you for taking your time to read this.

Yours sincerely

Isolde Sommer

PhD Student
University of Portsmouth
Dear Parent(s)/Legal guardian(s),

Re: An investigation of dietary patterns of food allergic consumers

I am writing to you about a study I am conducting at the University of Portsmouth. The study is about food allergic consumers and how they manage their diet. I would like to compare the diet of children with food allergies to those without.

Although a lot of research has been done with food allergic consumers, there is little in-depth knowledge about how a food allergy influences diet and how care can be targeted to better tailor their dietary management. Previous research has focussed on the impact of food allergy on quality of life and indeed, research suggests that food allergic consumers have a reduced quality of life compared to non-food allergic. However, little is known about if and to what extent food allergy affects the diet of food allergic consumers. We need information from a wide range of age groups including children, teenagers, and adults.

Therefore, I would like to collect information about what your son/daughter have had to eat and drink over several days. Everyone taking part in this dietary survey will be asked to complete a questionnaire about his diet and food allergy if applicable, and to keep a food and drink diary over 4 days. Since your son/daughter will be unable to carry out this task on their own, I would like to ask you to do it with their assistance. We would arrange a time and place that is convenient to you so that I can explain you the recording procedure. Detailed instructions on estimating and recording will also be provided in an instruction manual demonstrating the information. Additionally, I would phone you during the 4-days of recording to check whether you have any questions or you are experiencing any difficulties. I would meet with you after four days again to collect and review the food diary.

I have enclosed an information sheet for you, which gives you some more details about the study. Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their effort.

Please read the accompanying information sheet I have sent with this letter and talk together with your son/daughter to come to a joint decision about them participating. If
Invitation letter children/parents

you decide to participate then please sign and return the enclosed consent form.

If you have any questions at all or would just like more information, then please do not hesitate to contact me at the address or telephone number above. If you ring and I am not in please leave a message and I will return your call as soon as possible.

Thank you for taking you time to read this.

Yours sincerely

Isolde Sommer
PhD Student
Dear Parent/Legal guardian(s),

Re: An investigation of dietary patterns of food allergic consumers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food allergic consumers and how they manage their diet. I would like to compare the dietary patterns of teenagers with food allergies to those of teenagers without food allergies. I am writing to you as I would like to invite your son/daughter to take part in this study.

I would like to approach your son/daughter to ask if they would be interested in participating in my study but wanted to ask for your permission to do so first. Below is some information for you about the study. I have also included with this letter some information for your son/daughter about the study, a letter inviting him/her to take part and a consent form for him/her to reply with if he/she would like to take part. There is no need to reply to this letter. If you are happy for me to approach your son/daughter please pass the enclosed documents to him/her to read. If your son/daughter is keen to take part they can then complete their own consent form and return it to me in the stamped addressed envelope provided. If you are not happy for me to approach your son/daughter please discard the enclosed documents or return them to me in the stamped addressed envelope provided.

What is the study about?

I would like find out how teenagers, who have food allergies, manage their diet. At the moment we know very little about the actual dietary intake of teenagers with food allergies and whether their diet differs to that of non-food allergic teenagers. If we can understand how food allergies affect the diet of teenagers with food allergies, we can develop better ways of helping them.

I am looking for teenagers who:

1. EITHER have food allergies OR who do not suffer from any food allergies at all.
2. Are aged between 11 and 18.
3. Do not have any other conditions affecting their diet, e.g. diabetes...
Invitation letter teenagers 16-18y/parents

What would taking part involve?

If your son/daughter agrees to take part in the study, I would like to collect information about what he/she have had to eat and drink over several days. Everyone taking part in this dietary survey will be asked to complete a questionnaire about his diet and food allergy if applicable, and to keep a food and drink diary over 4 days. We would arrange a time and place that is convenient to your son/daughter so that I can explain the recording procedure. I will also give him/her a guidebook on how to keep the record. Please do also help your son/daughter with it. Additionally, I would phone him/her during the 4-days of recording to check whether he/she has any questions or is experiencing any difficulties. I would meet with him/her after four days again to collect and review the food diary.

I have enclosed an information sheet for you, which gives you some more details about the study. Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their effort.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours sincerely,

Isolde Sommer
PhD Student
School of Health Sciences and Social Work
University of Portsmouth
Dear Participant,

Re: An investigation of dietary patterns of food allergic consumers

My name is Isolde Sommer and I am a PhD student at the University of Portsmouth. I am conducting a research study on food allergic consumers and how they manage their diet. I would like to compare the dietary patterns of teenagers with food allergies to those of teenagers without food allergies. I am writing to you as I would like to invite you to take part in this study.

What is the study about?

I would like find out how teenagers, who have food allergies, manage their diet. At the moment we know very little about what teenagers with food allergies eat and whether their diet differs to that of non-food allergic teenagers. If we can understand how food allergies affect the diet of people like you, we can develop better ways of helping them.

I am looking for teenagers who:

1. EITHER have food allergies OR who do not suffer from any food allergies at all.
2. Are aged between 11 and 18.
3. Do not have any other conditions affecting their diet, e.g. diabetes...

What would taking part involve?

If you agreed to take part in the study, I would ask you to complete a questionnaire about yourself, your diet and your food allergy if you have one, and to keep a food and drink diary over 4 days. We would arrange a time and place that is convenient to you so that I can explain you the recording procedure. I will also give you a guidebook on how to keep the record. Please do also ask your parents to help you. Additionally, I would phone you during the 4-days of recording to check whether you have any questions or you are experiencing any difficulties. I would meet with you after four days again to collect and review the food diary.

I have enclosed an information sheet for you, which gives you some more details about the study. Participants who complete the dietary survey will receive a £10 gift voucher.
Invitation letter teenagers
to thank them for their time.

What should I do next?
If you would like to take part please complete the consent form that I have attached and return this to me. This should only take a few minutes to complete and I have enclosed a stamped addressed envelope for your convenience. If you would not like to take part you do not need to reply to this letter, and I would like to thank you for taking the time to read about the study.

If have any questions about the study please telephone me on 023 92844434 (I will call you straight back to save your telephone bill) or e-mail me at isolde.sommer@port.ac.uk.

Thank you for taking the time to read this letter,

Yours sincerely

Isolde Sommer
PhD Student
School of Health Sciences and Social Work
University of Portsmouth
Information sheet adults

This is to invite you to take part in a research study, which I am conducting. Before you decide whether you would like to participate, it is essential for you to understand why the research is being carried out and what it will involve. Please take time to read the following information carefully and discuss it with friends and relatives if you wish. Do ask me if there is anything that is not clear or if you would like more information. Feel free to take time to decide whether or not you wish to take part.

Thank you for reading this.

What is the purpose of the study?

The purpose of the study is to find out how food allergies affect the diet. I plan to compare the dietary patterns of adults with food allergies to those without any food allergy, in order to be able to understand the degree to which food allergies influence their diet. I hope this research will enable dietary advice to be better tailored to meet the needs of food allergic adults.

Why have I been chosen?

You have been chosen either because you have been diagnosed with food allergy OR because you do not suffer from any food allergy at all. You are therefore very valuable in helping me answer the research question.

Do I have to take part?

It is up to you to decide whether or not to take part. If you decide to be involved I suggest that you keep this information sheet. I will also ask you to complete and sign the enclosed consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason.

How is the study conducted?

This study is a quantitative study. This means that I need to collect as much information as possible about the diet of adults with and without food allergies. The more
Information sheet adults

you are able to share with me, the more accurate a picture I can develop about the diet of adults with food allergies.

What will happen if I decide to take part?

If you decide to take part in the study, I would like to collect information about what you have to eat and drink over a few days. Everyone taking part in this dietary survey will be asked to complete a questionnaire about his/her diet and food allergy if applicable, and to keep a food and drink diary over 4 days. We would arrange a time and place that is convenient to you, so that I can explain the recording procedure to you. Detailed instructions on estimating and recording will also be provided in an instruction manual, giving information and examples. Additionally, I will phone you during the 4-days of recording to check if you have any questions or you are experiencing any difficulties. I would then meet with you again after the four days to collect and review the food diary. Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their time.

What are the benefits of taking part?

You would not personally benefit from participating in the study. However, I hope that this study will lead to a better understanding on how the diet of adults with food allergies is managed.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks in taking part in this study, although it will involve some effort over four days.

Will my taking part in the study be kept confidential?

Yes. All information collected during the course of the research will be kept strictly confidential. Each participant will be allocated a code when analysing the questionnaire and diet records. All documents will be kept safe in a locked cabinet, and I will be the only person with access to it. The documents will be destroyed within 3 years. You will not be identified in any reports or publications resulting from this study.

With your agreement, I would like to inform your GP if any of the results of the dietary survey could be important for your health. Your GP can interpret the results in the light of your medical history. If any results fall outside the accepted normal values, your GP and you can decide on the best course of action, if any. I would feedback to you in this case.

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible, so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented in person at conferences and to individuals and organizations with an interest in them. I will also summarise my
Information sheet adults

findings in a brief report to all participants, who wish to find out more.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. Colleagues of the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight are involved in the study.

Who has reviewed the study?

The study has been reviewed by the Southampton and South West Hampshire Research Ethics Committee A.

What should I do next?

If you are interested in joining the study please sign the enclosed consent form, and then return it to me in the enclosed envelope. I will then contact you to arrange a meeting. To help me do this, could you please also write your contact details on the consent form.

If you have any questions at all then please contact me in any of the ways given above and I will be very happy to speak to you.

Thank you for your time.

Isolde Sommer
PhD Student

Version 1 12th of February 2011 REC No: 11/SC/0039
Information sheet children/parents

Dear Parent/Legal guardian(s),

I would like to invite your son/daughter to take part in a research study I am conducting. Before you decide whether you would like your son/daughter to participate, it is essential for you to understand why the research is being done and what it will involve. Please take time to read the following information and discuss it with friends, relatives and your GP if you wish. Please do ask me if there is anything that is not clear or if you would like more information. Please take time to decide whether or not you wish your child to take part.

Thank you for reading this.

What is the purpose of the study?

The purpose of the study is to find out how food allergies affect young people’s diets. I further would like to compare the dietary patterns of children with food allergies to those without to be able to understand the degree to which food allergies influence their diet. I hope this research will help to better tailor dietary management of food allergic children and to meet the needs.

Why has your son/daughter been chosen?

Your son/daughter has been chosen because he/she EITHER has been diagnosed with food allergy OR does not suffer from any food allergy at all. Your son/daughter is therefore valuable to help me answer the research question.

Do we have to take part?

No. It is up to you and your son/daughter to decide whether or not to take part. If your son/daughter does take part I suggest that you keep this information sheet. I will also ask you to complete and sign the enclosed consent form. If your son/daughter decides to take part they are still free to withdraw at any time and without giving a reason.

How is the study conducted?

Version 1 12th of February 2011 REC No: 11/SC/0039
Information sheet children/parents

This study is a quantitative study. This means that I need to collect as much information as possible about the diet of children with and without food allergies. The more you are able to share with me, the more accurate a picture I can develop about the diet of these children.

What will happen if we decide to take part?

If your son/daughter takes part in the study I would like to collect information about what your son/daughter has had to eat and drink over a several days. Everyone taking part in this dietary survey will be asked to complete a questionnaire about their diet and food allergy if applicable, and to keep a food and drink diary over 4 days. Since your son/daughter will be unable to carry out this task on their own, I would like to ask you to do it in collaboration with your child and any other carers who could contribute with information on their food and drink intake where possible. I would send you the food diary and questionnaire by post, and give you a ring so that I can explain the recording procedure to you. Detailed instructions on estimating and recording will also be provided in an instruction manual giving information and examples. Additionally, I will phone you during the 4-days of recording to check if you have any questions or you are experiencing any difficulties. I would then meet with you again after four days to collect and review the food diary. If meeting is not possible, we could also arrange for you to send the food diary by post. Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their time.

What are the benefits of taking part?

Your son/daughter would not personally benefit from participating in the study. However, I hope that this study will lead to a better understanding on how the diet of children with food allergies is managed.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks to your son/daughter in taking part in this study, although it will involve some effort over several days.

Will my child’s taking part in the study be kept confidential?

Yes. All information collected during the course of the research will be kept strictly confidential. Each participant will be allocated a code when analysing the questionnaire and diet records. All documents will be kept safe in a locked cabinet I will be the only person with access to it. The documents will be destroyed within 3 years time. Your son/daughter will not be identified in any reports or publications resulting from this study.

With your agreement, I would like to inform your child’s GP if any of the results of the dietary survey could be important for his/her health. Your GP can interpret the results in the light of your child’s medical history. If any results fall outside the normal values, his/her GP and you can decide on the best cause of action, if any. I would feedback to you in this case.
Information sheet children/parents

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented in person at conferences and to individuals and organizations with an interest in them. I will also summarise my findings in a brief report to all participants.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. Colleagues at the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight, are also involved in the study.

Who has reviewed the study?

The study has been reviewed by the Southampton and South West Hampshire Research Ethics Committee A (NHS).

What should we do next?

If you are interested in your child joining the study, please both sign the enclosed consent form and complete the screening questionnaire, and return these forms to me in the enclosed envelope by the 31st of January 2012. I will then contact you. To help me do this, could you please also write your contact details on the consent form.

If you have any questions at all then please contact me in any ways given above and I will be very happy to speak to you.

Thank you for your time.

Isolde Sommer
PhD Student

Version 1 12th of February 2011 REC No: 11/SC/0039
Information Sheet for Children

Hi, my name is Isolde and I work at the University of Portsmouth.
I would very much like to find out about what you eat and drink. I am asking for your help in my study because I know you have a food allergy OR you do not suffer from any food allergy at all. Children with food allergies might have a different diet than children who do not have a food allergy. Would you and your parents like to keep a diary of everything you eat and drink for me? It will only be over four days and will not take much time. It would be very good if you could help them with it.

If you want your parents to do it and say it’s okay, I will use your diary to to help me write up a report. I will not use your name and no one will know what foods you ate.

Remember, it’s okay if you don’t want your parents to keep the four day diary. If you do say you want them to do it and then later change your mind that’s okay too. No one will be upset in any way.

If you are not sure about anything ask your mum or dad. I would be happy to come and tell you more. If you think, you would like your parents to keep the diary, then please write your name on this paper or just tell your mum or dad. I will then send your parents the questionnaire and diary.

Thank you.

Isolde

Name: ___________________________ Date: ____________
Information sheet teenagers

Information sheet

Part 1: Some information for you about the project

I am asking you if you would agree to take part in a research project. In this project we are trying to answer the question “How does your food allergy influence your diet?” Before you decide if you want to take part or not it is important to understand why the research is being done and what it will involve for you. So please read this leaflet carefully. Talk about it with your family and friends, if you want to.

Thank you for reading this.

Why am I doing this research?

At the moment we do not know if, and to what extent, food allergy affects the diet of food allergic teenagers. I think it is important to understand how teenagers with food allergy manage their diet. I hope this research will help improve the health and lives of teenagers with a food allergy.

Why have I been asked to take part?

You have been chosen either because you have been diagnosed with food allergy OR because you do not suffer from any food allergy at all. You are therefore very valuable in helping me answer the research question.

Do I have to take part?

No! It is up to you. If you do, you will be asked sign (write your name) on a form to say you would like to take part. You will be given a copy of this information sheet and the form you signed (consent form) to keep. If you wish to stop taking part at any time during the research you are free to do so without giving a reason.

What will I be asked to do?

If you agree to take part in the study, I first need to ask you to complete a questionnaire and then to keep a food and drink diary over 4 days. With the questionnaire, I will ask you questions about yourself, your diet, and your food allergy if you have one. For the food diary, it is important that you describe, in as much detail as possible, what you have eaten and drunk on each day. I would arrange with you a time and place that is convenient so that I can explain about the recording procedure. I will also give you a guidebook on how to keep the record. Please do also ask your parents to help you. Additionally, I would phone you during the 4-days of recording to check if you have any questions or are experiencing any difficulties. I would meet with you again after four days to collect and review the food diary. Participants who complete the dietary survey will receive a £10 gift voucher to thank them for their time.

Version 1 12th of February 2011 REC No: 11/SC/0039
Information sheet teenagers

What are the benefits of taking part?

You would not personally benefit from participating in the study. However, I hope that this study will provide information about what teenagers with food allergies eat, and whether this is the same or different from teenagers without food allergy. You would help us have a better understanding of how the diet of teenagers with food allergies is managed.

Is there anything to be worried about if I take part?

There is nothing to be worried about when taking part in this study, although you will need to spend some time keeping your diary.

What if there is a problem?

If you are unhappy about any part of the project, you are welcome to contact me, Isolde Sommer, on 023 92844434 or email me at isolde.sommer@port.ac.uk or Prof Tara Dean on 023 92845243 or tara.dean@port.ac.uk.

Contact Details

If you would like to know anything else about this study or if you have any questions you are welcome to ring me (Isolde Sommer) on 023 9284 4434. I will try and call you straight back.

Thank you for reading this so far. If you are still interested please go to Part 2.

Part 2: Information you need to know if you still wish to take part.

What will happen if I don’t want to carry on with the research?

If you do not want to carry on with the food diary or if you change your mind about taking part please just let me know. You can then stop being involved in the study.

What happens when the research project stops?

After you have returned the questionnaire and food diary, I will analyse your diet. I will then write up my findings. At the end of the study I will write a big report about everything I have found. If you would like a copy of this report I can send this to you.

Will anyone else know I am doing this?

The information you give will be kept confidential. This means I am the only person that will know which questionnaire and food diary belongs to you, and I will not tell anybody that you have taken part. I will use a code for each participant when I analyse the data. All documents will be kept safe in a locked cabinet. I will be the only person who can open this cabinet. The questionnaire and food diary will be destroyed in 3 years time.
With your agreement, I would like to inform your GP if any of the results of the dietary survey could be important for your health. If there is anything to worry about, your GP can best decide what to do. I would feedback to your parents in this case.

What will happen to the results of the research study?

It is important that the results of the study are shared as widely as possible so that people can benefit from them. The results would therefore be published in suitable clinical journals, entered on electronic web-based databases and presented in person at conferences and to individuals and organisations with an interest in them.

Who is organising and funding the research?

The study is funded by the Institute of Biomedical and Biomolecular Sciences (IBBS), University of Portsmouth. Colleagues at the School of Health Sciences and Social Work at the University of Portsmouth and the David Hide Asthma and Allergy Research Centre on the Isle of Wight, are also involved in the study.

Who has reviewed the study?

Before any research can be carried out it has to be approved by an ethics committee. They make sure that the research is okay to do. This project has been checked by the Southampton and South West Hampshire Research Ethics Committee A.

What should I do next?

If you are interested in joining the study please sign the enclosed consent form, and then return it to me in the enclosed envelope. I will then contact you to arrange a meeting. To help me do this, could you please also write your phone number and address on the consent form.

Thank you for taking the time to read this. If you have any questions please ask. I would be very happy to speak with you.

Isolde Sommer
PhD Student

Version 1 12th of February 2011

REC No: 11/SC/0039
Parental consent form

Study Number:
Patient Identification Number for this study:

PARENTAL CONSENT FORM

Title of Project: An investigation of dietary patterns of food allergic consumers

Name of Researcher: Ms Isolde Sommer

1. I confirm that I have read and understand the information sheet dated ................................ (version ............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my son’s/daughter’s participation is voluntary and that he/she is free to withdraw at any time, without giving any reason, without his/her medical care or legal rights being affected.

3. I understand that any information given by my son/daughter will be used in any future reports, articles or presentations by the researcher.

4. I understand that my son’s/daughter’s name will not appear in any reports, articles or presentations.

5. I understand that my son’s/daughter’s GP will be informed if any of the results of the dietary survey as part of the research may be relevant for his/her health.

6. I agree to my son/daughter to be contacted about future research studies.

7. I agree to my son/daughter taking part in the above study.

Version 1 12th of February 2011 REC No: 11/SC/0039
Participant consent form

Study Number:
Patient Identification Number for this study:

PARTICIPANT CONSENT FORM

Title of Project: An investigation of dietary patterns of food allergic consumers

Name of Researcher: Ms Isolde Sommer

1. I confirm that I have read and understand the information sheet dated .......................... (version ............) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

3. I understand that any information given by me will be used in any future reports, articles or presentations by the researcher.

4. I understand that my name will not appear in any reports, articles or presentations.

5. I understand that my GP will be informed if any of the results of the dietary survey as part of the research may be relevant for my health.

6. I agree to be contacted about future research studies.

7. I agree to take part in the above study.

Version 1 12th of February 2011  REC No: 11/SC/0039
Dear [name of head teacher],

Re An investigation of dietary patterns of food allergic and non-food allergic children

I am a PhD student at University of Portsmouth and as part of my research project I am conducting a study that compares the dietary patterns of children with and without food allergies.

For this purpose, I would like to ask parents of children to keep a food and drink diary over 4 days and to complete a questionnaire. I am aiming to recruit 50 children (4-10 years) in total, 25 allergic and 25 non-allergic.

I would like to work with your school and ask for your help and invite some of the children in your school to take part in the project. The project itself would be done with the parents individually, so the school would only be involved in the recruitment process of the study. Naturally each school may only be able to contribute a few individuals towards this. I am collaborating with local hospitals and support charities to approach children with food allergies, so I am mainly aiming to approach non-food allergic children in your school.

If you would consider helping with this research I would be most grateful if you could let me know. I will be only too happy to visit you to discuss logistics etc in more detail.

I look forward to hearing from you.

Yours sincerely,

Isolde Sommer
PhD Student
University of Portsmouth
Dear [name of head teacher],

**Re An investigation of dietary patterns of food allergic and non-food allergic teenagers**

I am a PhD student at University of Portsmouth and as part of my research project I am conducting a study that compares the dietary patterns of teenagers with and without food allergies.

For this purpose, I would like to ask teenagers to keep a food and drink diary over 4 days and to complete a questionnaire. I am aiming to recruit 50 teenagers (11-18 years) in total, 25 allergic and 25 non-allergic.

I would like to work with your school and ask for your help and invite some of the teenagers in your school to take part in the project. The project itself would be done with them individually, so the school would only be involved in the recruitment process of the study. Naturally each school may only be able to contribute a few individuals towards this. I am collaborating with local hospitals and support charities to approach teenagers with food allergies, so I am mainly aiming to approach non-food allergic teenagers in your school.

The study has been approved by the Southampton & Southwest Hampshire Research Ethics Committee.

If you would consider helping with this research I would be most grateful if you could let me know. I will be only too happy to visit you to discuss logistics etc in more detail.

I look forward to hearing from you.

Yours sincerely,

Isolde Sommer
PhD Student
University of Portsmouth
What do you eat?  
Volunteers needed for a research study

The University of Portsmouth is conducting a dietary survey of food allergic and non-food allergic children, teenagers, and adults. You will be asked to complete a questionnaire and to keep a food and drink diary.

You can take part if:
• You are aged 4-65
• EITHER you have a confirmed diagnosis of egg, milk, peanuts, tree nuts, sesame, crustaceans, fish, or wheat allergy
• OR you do not have any food allergy at all
• AND you do not have any other illnesses affecting your diet (e.g. diabetes)

Participants will receive a £10 gift voucher!!

Please contact Isolde Sommer (PhD student) for further information!
E: isolde.sommer@port.ac.uk
T: 023 9284 4434
Reminder letter

Dear Participant,

I understand you have received an information pack about a study I am running called “An investigation of dietary patterns of food allergic consumers”. I would just like to remind you that if you would be interested in taking part please could you return the consent form by...........using the envelope provided.

If you have already done so or would not like to take part please ignore this letter.

Yours sincerely,

Isolde Sommer  
PhD Student  
School of Health Sciences and Social Work  
University of Portsmouth

Version 1  12th of February 2011  REC No: 11/SC/0039
Screening Checklist Dietary Assessment Study

Age: …………years

Gender:   Female   Male

Are you (Is your child) diagnosed with food allergy?   Yes  No

If yes, how were you (was your child) diagnosed with food allergy?

Skin prick test   Blood test   Other

Doctor’s diagnosis   Food challenge

If you ticked Other please tell me what it is ………………………………..

If yes, what food(s) are you (is your child) allergic to?

Egg   Milk   Peanuts   Tree nuts

Sesame   Crustaceans   Fish   Wheat

Others……………..

Do you (does your child) avoid food for other reasons than dislike?

Healthy diet   Food intolerance   Suspected food allergy

Makes me feel ill   Others

If Makes me feel ill, why? ………………………………………………………………..

If Others, which? …………………………………………………………………………

Do you (does your child) have any other condition/disease affecting the diet?

Yes  No

If yes, which? ………………………………………………………………………….
Health, diet and lifestyle questionnaire

About your health

1 Have you been diagnosed with a food allergy? Please tick.

☐ Yes  ☐ No

If yes, please contact Isolde Sommer and you will be provided with a different questionnaire.

If no, please continue.

2 Do you have any illnesses or conditions, e.g. diabetes, epilepsy etc.? Please tick.

☐ Yes  ☐ No

If yes, what are they? ________________________________

3 Are you currently taking any medication? Please tick.

☐ Yes  ☐ No

If yes, which one(s)? ________________________________
About your diet

4 What type of diet do you follow? Please tick only one option.

- Normal (eats meat and food from plants)
- Vegetarian (no meat)
- Vegan (eats only food from plant sources)
- Other: ________________________

5 How much attention do you pay to your diet in terms of healthy eating? Please tick one box.

Very little □ □ □ □ □ A great deal □

6 How would you describe your overall diet? Please tick only one option.

- It is different every day
- It is different only sometimes during the week
- It is different only during weekends
- It does not vary much

7 Do you avoid food for any reason? Please tick all appropriate boxes.

- Healthy diet
- Dislike
- Food intolerance
- Makes me feel ill
- Ethical concerns
- Suspected food allergy
- Other: ________________________

8 Are you currently taking any dietary supplements? Please tick.

- Yes
- No

If yes, what? ________________________
Appendix 6.17 - Questionnaire adults without food allergy: dietary intake study

About your lifestyle

9  Do you smoke? Please tick.

☐ Yes  ☐ No

If yes, how many cigarettes do you smoke per day? ______

10  If ‘no’ to Q. 9, have you ever smoked on a regular basis? Please tick.

☐ Yes  ☐ No

11  How much alcohol did you drink on your heaviest day of consumption last week? Please tick the appropriate box.

☐ Did not drink  ☐ _____ Glasses (125ml) of wine
☐ _____ Shots (25ml) of spirits  ☐ _____ Pints of ale
☐ _____ Pints of lager  ☐ Other: _______________________

12  How many days per week do you perform at least 30 minutes of moderate physical activity? Please fill in the number of days.

______ Day(s)

About you

13  How old are you? ______

14  Your gender:

☐ Female  ☐ Male

15  Your height: __________  Your weight: __________
16 What is your ethnic background? Please tick only one option.

- White British
- White European
- White Other
- Black: British Caribbean
- Black: British African
- Black: British Other
- Asian: British Indian
- Asian: British Other
- Mixed Background
- Chinese
- Other: ________________

17 What is your current marital status? Please tick only one option.

- Single
- Married
- Separated
- Divorced
- Widowed
- Cohabiting (living with partner)

18 What is your occupational status? Please tick only one option.

- Student
- Self-employed
- Full-time employed
- Part-time employed
- Retired
- Unemployed
- Other: ________________

19 What is your highest qualifications? Please tick only one option.

- None
- GCSE (or equivalent qualification)
- A-level (or equivalent qualification)
- Graduate level qualification
- Post-graduate qualification
- Other: ________________

20 How many persons, including yourself, live in your household?

______________

21 Which of the following best describes the area you live in? Please tick only one option.

- City
- Town
- Village
- Countryside
- Other: ________________
Your GP

Name:
Address:

Is there any other further dietary information about yourself that you have not mentioned in this questionnaire?

Thank you for taking the time to complete this questionnaire.
This questionnaire will ask you questions about your health, diet, lifestyle and about yourself.

Please complete this form by ticking the boxes or writing in the appropriate parts and return it with the food diary to the researcher.

Please answer every question even if the answer is 'no'. If you have any queries, please contact Isolde Sommer on (023) 9284 4434.

About your health

1. Have you been diagnosed with a food allergy? Please tick.

☐ Yes   ☐ No

If yes, please contact Isolde Sommer and you will be provided with a different questionnaire.

If no, please continue.

2. Do you have any illnesses or conditions, e.g. diabetes, epilepsy etc.? Please tick.

☐ Yes   ☐ No

If yes, what are they? ________________________________

3. Are you currently taking any medication? Please tick.

☐ Yes   ☐ No

If yes, which one(s)? ________________________________
### About your diet

4. **What type of diet do you follow?** Please tick only one option.

- Normal (eats meat and food from plants)
- Vegetarian (no meat)
- Vegan (eats only food from plant sources)
- Other: ____________

5. **How much attention do you pay to your diet in terms of healthy eating?**
   Please tick one box.

   - Very little
   - A great deal

6. **How would you describe your overall diet?** Please tick only one option.

   - It is different every day
   - It is different only sometimes during the week
   - It is different only during weekends
   - It does not vary much

7. **Do your parents influence what you eat?** Please tick one circle.

   - Not at all
   - Extremely

8. **Do you avoid food for any reason?**
   Please tick all appropriate boxes.

   - Healthy diet
   - Dislike
   - Makes me feel ill
   - Ethical concerns
   - Food intolerance
   - Suspected food allergy
   - Other: ________________________________

9. **Are you currently taking any dietary supplements?** Please tick.

   - Yes
   - No

   If yes, what? ________________________________
Appendix 6.18 - Questionnaire teenagers without food allergy: dietary intake study

About your lifestyle

10 Have you ever tried a cigarette? Please tick.
   ☐ Yes               ☐ No

11 Do you smoke on a regular basis? Please tick.
   ☐ Yes               ☐ No
   If yes, how many cigarettes do you smoke per day? ______

12 How often do you drink alcohol? Please tick.
   ☐ Almost every day  ☐ About once a week  ☐ About twice a week
   ☐ About once a fortnight  ☐ About once a month  ☐ Only a few times a year
   ☐ Never

13 How many days per week do you perform at least 30 minutes of moderate physical activity? Please fill in the number of days.
   ______ Day(s)

About you

14 How old are you? ______

15 Your gender:
   ☐ Female               ☐ Male

16 Your height: _________   Your weight: __________
17 What is your ethnic background? Please tick only one option.

- White British
- White European
- White Other
- Black: British Caribbean
- Black: British African
- Black: British Other
- Asian: British Indian
- Asian: British Other
- Mixed Background
- Other: ____________

18 What is your parents’ current occupational status? Please tick only one option for each parent.

Mother
- Student
- Self-employed
- Full-time employed
- Part-time employed
- Retired
- Unemployed
- Other: ________________

Father
- Student
- Self-employed
- Full-time employed
- Part-time employed
- Retired
- Unemployed
- Other: ________________

19 What is the highest qualification your mother and father hold? Please tick only one option for each parent.

Mother
- None
- GCSE (or equivalent qualification)
- A-level (or equivalent qualification)
- Graduate level qualification
- Post-graduate qualification
- Other: ________________

Father
- None
- GCSE (or equivalent qualification)
- A-level (or equivalent qualification)
- Graduate level qualification
- Post-graduate qualification
- Other: ________________

20 How many persons, including yourself, live in your household?

___________
Appendix 6.18 - Questionnaire teenagers without food allergy: dietary intake study

21 Do you live in...?
Please tick only one option.

☐ a city          ☐ a town          ☐ a village
☐ the countryside ☐ Other: __________________________

22 Your GP

Name:
Address:

23 Is there any further dietary information about yourself that you have not mentioned in this questionnaire?

Thank you for taking the time to complete this questionnaire.

© Isolde Sommer, University of Portsmouth 2011
Non-allergic children
(Study No. ___)

Health and diet questionnaire

This questionnaire will ask you questions about your child’s health and diet.

Please complete this form by ticking the boxes or writing in the appropriate parts and return it with the food diary to the researcher.

Please answer every question even if the answer is ‘no’. If you have any queries, please contact Isolde Sommer on (023) 9284 4434.

About your child’s health

1 Has your child been diagnosed with a food allergy? Please tick.
   ☐ Yes ☐ No
   If yes, please contact Isolde Sommer and you will be provided with a different questionnaire.
   If no, please continue.

2 Does your child have any illnesses or conditions, e.g. diabetes, epilepsy etc.? Please tick.
   ☐ Yes ☐ No
   If yes, what are they? ________________________________

3 Is he/she currently taking any medication? Please tick.
   ☐ Yes ☐ No
   If yes, which one(s)? ________________________________
### About your child’s diet

**4. What type of diet is he / she following?** Please tick only one option.

- [ ] Normal (eats meat and food from plants)
- [ ] Vegetarian (no meat)
- [ ] Vegan (eats only food from plant sources)
- [ ] Other: _______________

**5. How much attention do you pay to your child’s diet in terms of healthy eating?** Please tick one box.

- [ ] Very little
- [ ] A great deal

**6. How would you describe your child’s overall diet?** Please tick only one option.

- [ ] It is different every day
- [ ] It is different only sometimes during the week
- [ ] It is different only during weekends
- [ ] It does not vary much

**7. Does your child avoid food for any reason?** Please tick all appropriate boxes.

- [ ] Healthy diet
- [ ] Dislike
- [ ] Food intolerance
- [ ] Makes him / her feel ill
- [ ] Ethical concerns
- [ ] Suspected food allergy
- [ ] Other: _______________

**8. Is your child currently taking any dietary supplements?** Please tick.

- [ ] Yes
- [ ] No

If yes, what? _______________

### About your child

**9. How old is he / she?_____**
10 Your child’s gender:
   □ Female    □ Male

11 Your child’s height: ________  Your child’s weight: ________

12 What is your child’s ethnic background? Please tick only one option.
   □ White British     □ White European     □ White Other
   □ Black: British Caribbean  □ Black: British African  □ Black: British Other
   □ Asian: British Indian   □ Asian: British Other    □ Mixed Background
   □ Chinese            □ Other: ________________

13 What is the child’s parents’ occupational status?
Please tick only one for each parent.

   Mother                  Father
   □ Student          □ Student
   □ Self-employed    □ Self-employed
   □ Full-time employed □ Full-time employed
   □ Part-time employed □ Part-time employed
   □ Retired           □ Retired
   □ Unemployed        □ Unemployed
   □ Other: ________________ □ Other: ________________

14 What is the highest qualification the child’s mother and father hold?
Please tick only one for each parent.

   Mother                   Father
   □ None               □ None
   □ GCSE (or equivalent qualification) □ GCSE (or equivalent qualification)
   □ A-level (or equivalent qualification) □ A-level (or equivalent qualification)
   □ Graduate level qualification □ Graduate level qualification
   □ Post-graduate qualification □ Post-graduate qualification
   □ Other: ____________________ □ Other: ____________________
15 How many persons, including your child, live in your household?


16 Which of the following best describes the area your child lives in?
Please tick only one option.

☐ City  ☐ Town  ☐ Village
☐ Countryside  ☐ Other: __________

17 Your child’s GP

Name:

Address:

18 Is there any further dietary information about your child that you have not mentioned in this questionnaire?


Thank you for taking the time to complete this questionnaire.
This questionnaire will ask you questions about your health, diet, lifestyle and about yourself. Please complete this form by ticking the boxes or writing in the appropriate parts and return it with the food diary to the researcher.

Please answer every question even if the answer is ‘no’. If you have any queries, please contact Isolde Sommer on (023) 9284 4434.

Food Allergy Questionnaire

About your food allergy

1 Which food(s) are you allergic to? Please tick all appropriate boxes.

- Peanut
- Soya
- Wheat
- Fruits
- Tree nuts
- Egg
- Fish
- Vegetables
- Milk
- Shellfish
- Sesame
- Other: _______________________________________________________________________

Have you outgrown a food allergy?

- Yes
- No
- Don’t know

If yes, which? _______________________________________________________________________

2 At what age did you first discover your food allergy? Please fill in and delete as appropriate.

- Peanut: _____ months / years
- Wheat: _____ months / years
- Tree nuts: _____ months / years
- Fish: _____ months / years
- Milk: _____ months / years
- Sesame: _____ months / years
- Soya: _____ months / years
- Fruits: _____ months / years
- Egg: _____ months / years
- Vegetables: _____ months / years
- Shellfish: _____ months / years
- Other: _____ months / years
3 How were you diagnosed with a food allergy? Please tick all appropriate boxes and name the food(s) you were diagnosed as being allergic to.

☐ Skin prick test: ________________________________
☐ Blood test: ________________________________
☐ Doctor's diagnosis: ________________________________
☐ Food challenge: ________________________________
☐ Other: ________________________________

4 Do you have (or have had in the past) any other allergies or asthma? Please tick all appropriate boxes.

☐ Pet allergy (e.g. cat) ☐ Asthma
☐ House dust mite ☐ Eczema
☐ Hayfever ☐ Other: ________________________________

5 Do you have any other illnesses or conditions, e.g. diabetes, hypercholesterolemia etc.? Please tick.

☐ Yes ☐ No

If yes, what are they? ________________________________

6 Are you currently taking any medication? Please tick.

☐ Yes ☐ No

If yes, which one(s)? ________________________________

7 Does another member of your family living with you suffer from a food allergy? Please tick.

☐ Yes ☐ No

If yes, how is he / she related to you? Please tick.

☐ Wife ☐ Husband
☐ Mother ☐ Father
☐ Child(ren), if more than one, how many? _____________
☐ Sibling(s), if more than one, how many? _____________
About your reactions

8 When was the last time you had an allergic reaction to food? 
   *Please tick the appropriate box and circle with which food this reaction occurred.*

- [ ] Never 
- [ ] More than 10 years ago 
- [ ] Within the last 10 years 
- [ ] Within the last 5 years 
- [ ] Within the last 2 years 
- [ ] Within the last year

Milk / Egg / Peanut / Tree nut / Wheat / Fish / Sesame / Other: _____________

Was it accidental?

- [ ] Yes 
- [ ] No 
- [ ] Don't know

9 What happens to you when you have an allergic reaction to food? 
   *Please tick all appropriate boxes.*

- [ ] Hives (itchy rash / bites) 
- [ ] Stomach cramps 
- [ ] Swelling (oedema) of face / lips 
- [ ] Throat / tongue swells up 
- [ ] Sick / vomiting 
- [ ] Difficulty breathing, e.g. asthma 
- [ ] Loss of consciousness 
- [ ] Diarrhoea 
- [ ] Never had a reaction 
- [ ] Other: _____________

About your diet

10 What type of diet do you follow? *Please tick only one option.*

- [ ] Normal (eats meat and food from plants) 
- [ ] Vegetarian (no meat) 
- [ ] Vegan (eats only food from plant sources) 
- [ ] Other: _____________

11 How much attention do you pay to your diet in terms of healthy eating? 
   *Please tick one box.*

- [ ] Very little 
- [ ] A great deal

---

Appendix 6.20 - Questionnaire adults with food allergy: dietary intake study
12 How would you describe your overall diet? Please tick only one option.

- ☐ It is different every day
- ☐ It is different only sometimes during the week
- ☐ It is different only during weekends
- ☐ It does not vary much

13 How does your food allergy affect your diet? Please tick one box.

- Not at all
- Extremely

14 Do you avoid the food(s) you are allergic to? Please tick all appropriate boxes.

- Milk: Always □ □ □ □ □ Never
- Egg: Always □ □ □ □ □ Never
- Peanut: Always □ □ □ □ □ Never
- Tree nuts: Always □ □ □ □ □ Never
- Wheat: Always □ □ □ □ □ Never
- Fish: Always □ □ □ □ □ Never
- Sesame: Always □ □ □ □ □ Never
- Other: □ □ □ □ □ Never

15 Which foods containing the allergen(s) are you able to tolerate and how much can you consume?

-

16 Do you avoid eating foods when you are unsure if they are safe for you to eat? Please tick all appropriate boxes.

- Milk: Always □ □ □ □ □ Never
- Egg: Always □ □ □ □ □ Never
**Appendix 6.20 - Questionnaire adults with food allergy: dietary intake study**

- **17 What measures do you take to avoid eating the food(s) you are allergic to?**
  - Reading ingredients list
  - Asking friends about food they have prepared
  - Asking cooks / chefs
  - Asking waiters / those serving food
  - Phone retailers
  - Internet / websites
  - Contact food producers
  - Other: __________________________

- **18 Do you avoid food for reasons other than your food allergy?**
  - Healthy diet
  - Dislike
  - Makes me feel ill
  - Ethical concerns
  - Other: __________________________

- **19 Throughout your food allergy, which health care professional(s) do you feel has / have helped you?**
  - Allergy specialist consultant
  - GP
  - Allergy nurse specialist
  - Dietician
  - Other: __________________________

- **20 Are you currently taking any dietary supplements because of your food allergy?**
  - Yes
  - No

  If yes, what? _____________________________________________________________________
About your lifestyle

21 Do you smoke? Please tick.

☐ Yes  ☐ No

If yes, how many cigarettes do you smoke per day? ______

22 If no to Q. 21, have you ever smoked on a regular basis? Please tick.

☐ Yes  ☐ No

23 How much alcohol did you drink on your heaviest day of consumption last week? Please tick the appropriate box.

☐ Did not drink  ☐ ______ Glasses (125ml) of wine
☐ ______ Shots (25ml) of spirits  ☐ ______ Pints of ale
☐ ______ Pints of lager  ☐ Other: _____________

24 How many days per week do you perform at least 30 minutes of moderate physical activity? Please fill in the number of days.

______. Day(s)

About you

25 How old are you? ______

26 Your gender:

☐ Female  ☐ Male

27 Your height: ___________  Your weight: ___________
28 What is your ethnic background? Please tick only one option.

- White British
- White European
- White Other
- Black: British Caribbean
- Black: British African
- Black: British Other
- Asian: British Indian
- Asian: British Other
- Mixed Background
- Chinese
- Other: ________________

29 What is your current marital status? Please tick only one option.

- Single
- Married
- Separated
- Divorced
- Widowed
- Cohabiting (living with partner)

30 What is your occupational status? Please tick only one option.

- Student
- Self-employed
- Full-time employed
- Part-time employed
- Retired
- Unemployed
- Other: ________________

31 What is your highest achieving qualification? Please tick only one option.

- None
- GCSE (or equivalent qualification)
- A-level (or equivalent qualification)
- Graduate level qualification
- Post-graduate qualification
- Other: ________________

32 How many persons, including yourself, live in your household?

______________

33 Which of the following best describes the area you live in? Please tick only one option.

- City
- Town
- Village
- Countryside
- Other: ________________
34 Your GP

Name:
Address:

35 Are there any other ways in which your food allergy affects your diet that you have not mentioned in this questionnaire?

Thank you for taking the time to complete this questionnaire.
Food Allergy Questionnaire

This questionnaire will ask you questions about your food allergy, diet and lifestyle.

Please complete this form by ticking the boxes or writing in the appropriate parts and return it with the food diary to the researcher.

Please answer every question even if the answer is ‘no’. If you have any queries, please contact Isolde Sommer on (023) 9284 4434.

About your food allergy

1. **Which food(s) are you allergic to?** Please tick all appropriate boxes.
   
   - Peanut
   - Soya
   - Wheat
   - Fruits
   - Tree nuts
   - Egg
   - Fish
   - Vegetables
   - Milk
   - Shellfish
   - Sesame
   - Other: ________________________________

2. **Have you outgrown a food allergy?**
   
   - Yes
   - No
   - Don’t know

   If yes, which? ________________________________

2. **At what age did you first discover your food allergy?**
   
   Please fill in and delete as appropriate.
   
   - Peanut: _____ months / years
   - Soya: _____ months / years
   - Wheat: _____ months / years
   - Fruits: _____ months / years
   - Tree nuts: _____ months / years
   - Egg: _____ months / years
   - Fish: _____ months / years
   - Vegetables: _____ months / years
   - Milk: _____ months / years
   - Shellfish: _____ months / years
   - Sesame: _____ months / years
   - Other: _____ months / years
3 **How were you diagnosed with a food allergy?** Please tick all appropriate boxes and name the food(s) you were diagnosed as being allergic to.

- Skin prick test: ________________________________
- Blood test: ________________________________
- Doctor’s diagnosis: ________________________________
- Food challenge: ________________________________
- Other: ________________________________

4 **Do you have (or have had in the past) any other allergies or asthma?** Please tick all appropriate boxes.

- Pet allergy (e.g. cat)
- Asthma
- House dust mite
- Eczema
- Hayfever
- Other: ________________________________

5 **Do you have any other illnesses or conditions, e.g. diabetes, hypercholesterolemia etc.?** Please tick.

- Yes
- No

If yes, what are they? ________________________________

6 **Are you currently taking any medication?** Please tick.

- Yes
- No

If yes, which one(s)? ________________________________

7 **Does another member of your family living with you suffer from a food allergy?** Please tick.

- Yes
- No

If yes, how is he / she related to you? Please tick.

- Mother
- Father
- Sibling(s), if more than one, how many? __________
About your reactions

8 When was the last time you had an allergic reaction to food?
Please tick the appropriate box and circle with which food this reaction occurred.

☐ Never ☐ More than 10 years ago ☐ Within the last 10 years
☐ Within the last 5 years ☐ Within the last 2 years ☐ Within the last year

Milk / Egg / Peanut / Tree nut / Wheat / Fish / Sesame / Other: ____________

Was it accidental?

☐ Yes ☐ No ☐ Don’t know

9 What happens to you when you have an allergic reaction to food?
Please tick all appropriate boxes.

☐ Hives (itchy rash / bites) ☐ Stomach cramps
☐ Swelling (oedema) of face / lips ☐ Throat / tongue swells up
☐ Sick / vomiting ☐ Difficulty breathing, e.g. asthma
☐ Loss of consciousness ☐ Diarrhoea
☐ Never had a reaction ☐ Other: ____________

About your diet

10 What type of diet do you follow? Please tick only one option.

☐ Normal (eats meat and food from plants) ☐ Vegetarian (no meat)
☐ Vegan (eats only food from plant sources) ☐ Other: ____________

11 How much attention do you pay to your diet in terms of healthy eating?
Please tick one box.

Very little ☐ ☐ ☐ ☐ ☐ A great deal

Appendix 6.21 - Questionnaire teenagers with food allergy: dietary intake study
12 How would you describe your overall diet? *Please tick only one option.*

- [ ] It is different every day
- [ ] It is different only sometimes during the week
- [ ] It is different only during weekends
- [ ] It does not vary much

13 Do your parents influence what you eat? *Please tick one box.*

- [ ] Not at all
- [ ] Extremely

14 How does your food allergy affect your diet? *Please tick one box.*

- [ ] Not at all
- [ ] Extremely

15 Do you avoid the food(s) you are allergic to? *Please tick all appropriate boxes.*

- [ ] Milk  [ ] Always  [ ] Never
- [ ] Egg  [ ] Always  [ ] Never
- [ ] Peanut  [ ] Always  [ ] Never
- [ ] Tree nuts  [ ] Always  [ ] Never
- [ ] Wheat  [ ] Always  [ ] Never
- [ ] Fish  [ ] Always  [ ] Never
- [ ] Sesame  [ ] Always  [ ] Never
- [ ] Other:  [ ] Always  [ ] Never

16 Which foods containing the allergen(s) are you able to tolerate and how much can you consume?
Appendix 6.21 - Questionnaire teenagers with food allergy: dietary intake study

17. Do you avoid eating foods when you are unsure if they are safe for you to eat? Please tick all appropriate boxes.

☐ Milk
☐ Egg
☐ Peanut
☐ Tree nuts
☐ Wheat
☐ Fish
☐ Sesame
☐ Other: __________

18. What measures do you take to avoid eating the food(s) you are allergic to? Please tick all appropriate boxes.

☐ Reading ingredients list
☐ Asking cooks / chefs
☐ Asking waiters / those serving food
☐ Phone retailers
☐ Internet / websites
☐ Contact food producers
☐ Other: ________________________

19. Do you avoid food for reasons other than your food allergy? Please tick all appropriate boxes.

☐ Healthy diet
☐ Dislike
☐ Makes me feel ill
☐ Ethical concerns
☐ Other: ________________________

20. Throughout your food allergy, which health care professional(s) do you feel has / have helped you? Please tick all appropriate boxes.

☐ Allergy specialist consultant
☐ GP
☐ Allergy nurse specialist
☐ Dietician
☐ Other: ________________________
Appendix 6.21 - Questionnaire teenagers with food allergy: dietary intake study

21 Are you currently taking any dietary supplements because of your food allergy? Please tick.

☐ Yes  ☐ No

If yes, what? __________________________________________

About your lifestyle

22 Have you ever tried a cigarette? Please tick.

☐ Yes  ☐ No

23 Do you smoke on a regular basis? Please tick.

☐ Yes  ☐ No

If yes, how many cigarettes do you smoke per day? ______

24 How often do you drink alcohol? Please tick.

☐ Almost every day  ☐ About twice a week  ☐ About once a week
☐ About once a fortnight  ☐ About once a month  ☐ Only a few times a year
☐ Never drink

25 How many days per week do you perform at least 30 minutes of moderate physical activity? Please fill in the number of days.

______ Day(s)

About you

26 How old are you? ______

27 Your gender:

☐ Female  ☐ Male
28 Your height: ___________ Your weight: ___________

29 What is your ethnic background? Please tick only one option.
- [ ] White British
- [ ] White European
- [ ] White Other
- [ ] Black: British Caribbean
- [ ] Black: British African
- [ ] Black: British Other
- [ ] Asian: British Indian
- [ ] Asian: British Other
- [ ] Mixed Background
- [ ] Chinese
- [ ] Other: ___________

30 What is your parents’ current occupational status?
Please tick only one option for each parent.

Mother
- [ ] Student
- [ ] Self-employed
- [ ] Full-time employed
- [ ] Part-time employed
- [ ] Retired
- [ ] Unemployed
- [ ] Other: ___________

Father
- [ ] Student
- [ ] Self-employed
- [ ] Full-time employed
- [ ] Part-time employed
- [ ] Retired
- [ ] Unemployed
- [ ] Other: ___________

31 What is the highest qualification your mother and father hold?
Please tick only one option for each parent.

Mother
- [ ] None
- [ ] GCSE (or equivalent qualification)
- [ ] A-level (or equivalent qualification)
- [ ] Graduate level qualification
- [ ] Post-graduate qualification
- [ ] Other: ___________

Father
- [ ] None
- [ ] GCSE (or equivalent qualification)
- [ ] A-level (or equivalent qualification)
- [ ] Graduate level qualification
- [ ] Post-graduate qualification
- [ ] Other: ___________

32 How many persons, including yourself, live in your household?

___________
Do you live in...?  
Please tick only one option.

☐ a city  ☐ a town  ☐ a village  
☐ the countryside  ☐ Other: ____________

Your GP

Name:
Address:

Are there any other ways in which your food allergy affects your diet that you have not mentioned in this questionnaire?

Thank you for taking the time to complete this questionnaire.
Food Allergy Questionnaire

About your child's food allergy

1 Which food(s) is your child allergic to? Please tick all appropriate boxes.

- [ ] Peanut
- [ ] Soya
- [ ] Wheat
- [ ] Fruits
- [ ] Tree nuts
- [ ] Egg
- [ ] Fish
- [ ] Vegetables
- [ ] Milk
- [ ] Shellfish
- [ ] Sesame
- [ ] Other: ____________________________

Did he / she outgrow a food allergy?

- [ ] Yes
- [ ] No
- [ ] Don’t know

If yes, which? __________________________________________

2 How old was your child when his / her food allergy(ies) was / were first discovered? Please fill in and delete as appropriate.

- [ ] Peanut: ____ months / years
- [ ] Soya: ____ months / years
- [ ] Wheat: ____ months / years
- [ ] Fruits: ____ months / years
- [ ] Tree nuts: ____ months / years
- [ ] Egg: ____ months / years
- [ ] Fish: ____ months / years
- [ ] Vegetables: ____ months / years
- [ ] Milk: ____ months / years
- [ ] Shellfish: ____ months / years
- [ ] Sesame: ____ months / years
- [ ] Other: ____ months / years
How was he / she diagnosed with a food allergy? Please tick all appropriate boxes and name the food(s) your child was diagnosed as being allergic to.

☐ Skin prick test: ________________________________
☐ Blood test: ________________________________
☐ Doctor’s diagnosis: ________________________________
☐ Food challenge: ________________________________
☐ Other: ________________________________

Does your child have (or has had in the past) any other allergies or asthma? Please tick all appropriate boxes.

☐ Pet allergy (e.g. cat) ☐ Asthma
☐ House dust mite ☐ Eczema
☐ Hayfever ☐ Other: ________________

Does he / she have any other illnesses or conditions, e.g. diabetes, epilepsy etc.? Please tick.

☐ Yes ☐ No

If yes, what are they? ________________________________

Is he / she currently taking any medication? Please tick.

☐ Yes ☐ No

If yes, which one(s)? ________________________________

Does another member of your family suffer from a food allergy? Please tick.

☐ Yes ☐ No

If yes, how is he / she related to your child? Please tick.

☐ Mother ☐ Father
☐ Sibling(s) ☐ If more than one, how many? _____
☐ Other: ________________
About your child’s reactions

8 When was the last time your child had an allergic reaction to food?
Please tick the appropriate box and circle with which food this reaction occurred.

☐ Never          ☐ More than 10 years ago
☐ Within the last 5 years    ☐ Within the last 2 years    ☐ Within the last year

Milk / Egg / Peanut / Tree nut / Wheat / Fish / Sesame / Other: ____________

Was it accidental?

☐ Yes          ☐ No          ☐ Don’t know

9 What happens to your child when he / she has an allergic reaction to food?
Please tick all appropriate boxes.

☐ Hives (itchy rash / bites)          ☐ Stomach cramps
☐ Swelling (oedema) of face / lips    ☐ Throat / tongue swells up
☐ Sick / vomiting                     ☐ Difficulty breathing, e.g. asthma
☐ Loss of consciousness              ☐ Diarrhoea
☐ He / she has never had a reaction  ☐ Other: ____________

About your child’s diet

10 What type of diet is he / she following? Please tick only one option.

☐ Normal (eats meat and food from plants)
☐ Vegetarian (no meat)
☐ Vegan (eats only food from plant sources)
☐ Other: ____________

11 How much attention do you pay to your child’s diet in terms of healthy eating?
Please tick one box.

Very little ☐ ☐ ☐ ☐ A great deal
12 How would you describe your child’s overall diet? Please tick only one option.

☐ It is different every day
☐ It is different only sometimes during the week
☐ It is different only during weekends
☐ It does not vary much

13 How does your child’s food allergy affect his / her diet? Please tick one.

Not at all ☐ ☐ ☐ ☐ Extremely

14 Does your child avoid the food(s) he / she is allergic to?
Please tick all appropriate boxes.

☐ Milk ☐ ☐ ☐ ☐ ☐ Never
☐ Egg ☐ ☐ ☐ ☐ ☐ Never
☐ Peanut ☐ ☐ ☐ ☐ ☐ Never
☐ Tree nuts ☐ ☐ ☐ ☐ ☐ Never
☐ Wheat ☐ ☐ ☐ ☐ ☐ Never
☐ Fish ☐ ☐ ☐ ☐ ☐ Never
☐ Sesame ☐ ☐ ☐ ☐ ☐ Never
☐ Other: ☐ ☐ ☐ ☐ ☐ Never

15 Which foods containing the allergen(s) is your child able to tolerate and how much can he / she consume?

☐ Milk
☐ Egg

16 Do you prevent your child from eating foods if you are unsure whether they are safe for him / her to eat? Please tick all appropriate boxes.

☐ Milk ☐ ☐ ☐ ☐ Never
☐ Egg ☐ ☐ ☐ ☐ Never
Peanut Always Never
Tree nuts Always Never
Wheat Always Never
Fish Always Never
Sesame Always Never
Other: 

17 What measures do you take to prevent your child eating the food he / she is allergic to? Please tick all appropriate boxes.

☐ Reading ingredients list
☐ Asking friends about food they have prepared
☐ Asking cooks / chefs
☐ Asking waiters / those serving food
☐ Phone retailers
☐ Contact food producers
☐ Internet / websites
☐ Other: 

18 Does your child avoid food for reasons other than his / her food allergy? Please tick all appropriate boxes.

☐ Healthy diet
☐ Dislike
☐ Makes him / her feel ill
☐ Ethical concerns
☐ Other: 

19 Throughout your child’s food allergy, which health care professional(s) do you feel has / have helped you? Please tick all appropriate boxes.

☐ Allergy specialist consultant
☐ GP
☐ Allergy nurse specialist
☐ Dietician
☐ Other: 

20 Is your child currently taking any dietary supplements because of his / her food allergy? Please tick.

☐ Yes
☐ No

If yes, what? 

Appendix 6.22 - Questionnaire children with food allergy: dietary intake study
About your child

21 How old is he / she? ____

22 Your child’s gender:

☐ Female  ☐ Male

23 Your child’s height: ________  Your child’s weight: ________

24 What is your child’s ethnic background? Please tick only one option.

☐ White British  ☐ White European  ☐ White Other
☐ Black: British Caribbean  ☐ Black: British African  ☐ Black: British Other
☐ Asian: British Indian  ☐ Asian: British Other  ☐ Mixed Background
☐ Chinese  ☐ Other: ________

25 What is the child’s parents’ occupational status?
Please tick only one for each parent.

Mother  Father
☐ Student  ☐ Student
☐ Self-employed  ☐ Self-employed
☐ Full-time employed  ☐ Full-time employed
☐ Part-time employed  ☐ Part-time employed
☐ Retired  ☐ Retired
☐ Unemployed  ☐ Unemployed
☐ Other: ________  ☐ Other: ________

26 What is the highest qualification the child’s mother and father hold?
Please tick only one for each parent.

Mother  Father
☐ None  ☐ None
☐ GCSE (or equivalent qualification)  ☐ GCSE (or equivalent qualification)
☐ A-level (or equivalent qualification)  ☐ A-level (or equivalent qualification)
Appendix 6.22 - Questionnaire children with food allergy: dietary intake study

☐ Graduate level qualification
☐ Post-graduate qualification
☐ Other: ____________________________

27 How many persons, including your child, live in your household?

__________

28 Which of the following best describes the area your child lives in?

Please tick only one option.

☐ City
☐ Town
☐ Village
☐ Countryside
☐ Other: ____________________________

29 Your child’s GP

Name:
Address:

30 Are there any other ways in which your child’s food allergy affects his / her diet that you have not mentioned in this questionnaire?

Thank you for taking the time to complete this questionnaire.

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## Food diary: day 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Where? With Whom? TV on? At table?</th>
<th>Food / Drink description &amp; preparation</th>
<th>Brand name</th>
<th>Portion size or quantity eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 am to 9 am</td>
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<tr>
<td>9 am to 12 noon</td>
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</table>

Appendix 6.23 - Example food diary: dietary intake study
<table>
<thead>
<tr>
<th>Time</th>
<th>Where? With Whom? TV on? At table?</th>
<th>Food / Drink description &amp; preparation</th>
<th>Brand name</th>
<th>Portion size or quantity eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 noon to 2 pm</td>
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<tr>
<td>2 pm to 5 pm</td>
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<tr>
<td>5 pm to 8 pm</td>
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<td></td>
</tr>
<tr>
<td>Time</td>
<td>Where? With Whom?</td>
<td>Food / Drink description &amp; preparation</td>
<td>Brand name</td>
<td>Portion size or quantity eaten</td>
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<td>8 pm to 10 pm</td>
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<tr>
<td>10 pm to 6 am</td>
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**Was the amount of food that you had today about what you usually have, less than usual, or more than usual?**

- Yes, usual [ ]
- No, less than usual [ ]
- No, more than usual [ ]

Please tell us why you had less than usual

Please tell us why you had more than usual

---

Appendix 6.23 - Example food diary: dietary intake study
Was the amount you had to drink today, including water, tea, coffee and soft drinks (and alcohol), about what you usually have, less than usual, or more than usual?

Yes, usual ☐  No, less than usual ☐  No, more than usual ☐

Please tell us why you had less than usual

Please tell us why you had more than usual

Did you finish all the food and drink that you recorded in the diary today?

Yes ☐  No ☐

If no, please go back to the diary and make a note of any leftovers

Did you take any vitamins, minerals or other food supplements today?

Yes ☐  No ☐
If **yes**, please describe the supplements you took below.

<table>
<thead>
<tr>
<th>Brand</th>
<th>Name (in full) including strength</th>
<th>Number of pills, capsules, teaspoons</th>
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<tr>
<td>Ingredients</td>
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**Name of dish:**

**Serves:**

**Brief description of cooking method:**
<table>
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<th>Ingredients</th>
<th>Amount</th>
<th>Ingredients</th>
<th>Amount</th>
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Brief description of cooking method: