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Swansea University
Prifysgol Abertawe

**Differences in maternal influences upon child weight
between ethnic groups in the UK: A mixed methods
study**

Murhaf Fouad Korani

**Submitted to
Swansea University
in fulfilment of the requirements for the
Degree of
Doctor of Philosophy**

College of Human and Health Sciences

2019



**IN THE NAME OF GOD
THE COMPASSIONATE THE MERCIFUL**

DECLARATIONS AND STATEMENTS

DECLARATION

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

Signed (candidate)

Date

STATEMENT 1

This thesis is the result of my own investigations, except where otherwise stated.

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STATEMENT 2

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PUBLICATIONS AND PRESENTATIONS

Korani, M.F., Rea, D.M., King, P.F., & Brown, A.E. (2018). Significant differences in maternal child-feeding style between ethnic groups in the UK: the role of deprivation and parenting styles. *Journal of Human Nutrition and Dietetics*, DOI:10.1111/jhn.12557

Korani, M.F., Rea, D.M., King, P.F., & Brown, A.E. (2018). Maternal eating behaviour differs between ethnic groups: Considerations for research and practice. *Maternal & Child Nutrition*, DOI:10.1111/mcn.12630

Oral presentation

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ABSTRACT

Childhood obesity has serious public health implications and is an economic burden. The National Child Measurement Programme in the UK has repeatedly highlighted ethnic differences in obesity during childhood, with children from Black and South Asian backgrounds being significantly more likely to be overweight compared to White Caucasians, with those from a Chinese background having further reduced rates. Limited research has considered how differences in genetics, nutrient intake and physical activity level between the ethnic groups may contribute to these differences but little research has been conducted from a UK perspective to understand how psychological, social, and cultural influences on child obesity may be affecting variation between groups. The aim of this thesis was therefore to explore how these aspects may explain patterns in childhood obesity between ethnic groups in the UK.

Study one qualitatively explored the contributing factors from (n=37) professional viewpoints on what might be the reasons as to why differences in child overweight and obesity between ethnic groups exist. Eight themes emerged from the analysis, which fitted well with the Bronfenbrenner Ecological Systems Theory approach to understanding layers of social and cultural influences upon behaviour. This included multiple factors at the individual level that involve body composition or genetics, diet and exercise. Factors at the microsystem level included maternal child weight perceptions, feeding styles, and parenting interactions. The exosystem level of concerns include socioeconomic status. Other factors at the exosystem level involve wider family influences, and factors in and around the macrosystem level including the influence of a wider culture. Applying this to existing literature, the microsystem factors, e.g. maternal perceptions and behaviours, were identified as a particular gap in understanding the issue in a UK sample.

Study two therefore quantitatively examined (n=659) whether differences in maternal perceptions of child weight, feeding interactions, and her own eating behaviour differed between the four main ethnic groups in the UK; White, Black, South Asian and Chinese. The findings identified that Black and South Asian mothers were more likely to show a preference for a larger child size than White and

Chinese mothers, whilst South Asian mothers also used higher levels of pressurising and emotional feeding styles coupled with higher levels of their own emotional eating behaviour than other ethnic groups. Conversely, mothers from Chinese backgrounds adopted more restrictive approaches both for their children and their own eating behaviours.

Study three used focus groups to further understand the pattern of findings found for South Asian mothers, exploring beliefs and practices around food, diet and mothering. The findings highlighted how embedded food and diet was within cultural and social norms, particularly feeding behaviour emphasising food sharing, identity formulation and an important part of tradition.

Overall this thesis identified differences in maternal preferences, feeding interactions and their own eating behaviour between ethnic groups which may in part explain differences in child weight between ethnic groups. The data are discussed within a broader cultural context, considering how interventions to reduce child weight must be culturally appropriate, sensitive and acceptable. The findings will be of interest to those working both in research and practice in the area of childhood obesity, particularly in considering the importance of culturally appropriate interventions, recommendations and support.

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LIST OF ABBREVIATIONS

Body Mass Index [BMI]

Child Feeding Questionnaire [CFQ]

Children's Body Image Scale [CBIS]

Ecological Systems Theory [EST]

General Practitioner [GP]

Health Belief Model [HBM]

Health Visitor [HV]

National Child Measurement Programme [NCMP]

Office for National Statistics [ONS]

Parental Feeding Style Questionnaire [PFSQ]

Parenting Styles and Dimensions Questionnaire [PSDQ]

School Nurse [SN]

Socio-Ecological Model [SEM]

Three Factor Eating Questionnaire [TFEQ]

UK Department of Health [DH]

World Health Organisation [WHO]

Chapter 1

Introduction

Childhood overweight and obesity prevalence continues to increase worldwide (WHO, 2017). Obesity during childhood has negative implications for childhood health and wellbeing (Daniels, 2009), and has been linked to morbidity-related diseases both in childhood and into adulthood (Owen et al., 2009b; Park, Falconer, Viner & Kinra, 2012; Reilly & Kelly, 2011). Preventing and reducing levels of childhood obesity is therefore a global strategic priority.

Variations in levels of childhood obesity are often present between population groups. A well-established link for example shows that children living in deprived areas are more likely to be overweight or obese (Conrad & Capewell, 2012; Dubois & Girard, 2006; Kinra, Nelder, Lewendon, 2000). However, a lesser researched aspect is the finding that levels of childhood overweight and obesity differ between ethnic groups. In the UK, the National Child Measurement Programme (NCMP) has repeatedly identified that overweight and obesity in children differs by ethnicity, with the highest levels among Black or Black British and South Asian or South Asian British ethnic groups compared to White British children, with children from Chinese backgrounds having the lower overweight and obesity rates (Department of Health, 2011; 2013; 2015; 2017a). Understanding the factors that drive it is important when developing useful public health campaigns and supporting families to improve child health.

There are multiple factors which might contribute to the differences in obesity level between ethnic groups, including genetic, perinatal and early life factors, along with environmental influences playing a part (Ang, Wee, Poh, & Ismail, 2012; Caprio et al., 2008; Ebbeling, Pawlak, & Ludwig, 2002). These factors do not occur in isolation, and the interplay between biological and environmental factors will be important. Although essentially overweight and obesity occurs when energy intake exceeds energy needs, multiple factors will determine both what those energy needs are, and how much energy is consumed and expended (Carnell & Wardle, 2008; Patrick & Nicklaus, 2005).

Despite a wide body of literature examining the causal influences upon childhood obesity, research from a UK perspective infrequently considers how these factors may differ between ethnic groups. Conversely, in regions such as the USA, consideration of differences between ethnic groups are far more common. Research that has considered how factors may differ between ethnic groups in the UK has focussed predominantly upon areas such as genetic causes (Nazroo, 1998), diet (Gatineau & Mathrani, 2011a) and activity (Owen et al., 2009a). However, influences on obesity are far more complex, including numerous behavioural factors.

One area where there is a growing body of research evidence is in relation to the risks associated with development of obesity. However, there is sparse research around maternal influences on development of obesity that link to differences between ethnic groups in the UK. Issues such as maternal preferences for child body weight and size, maternal feeding interactions and maternal own eating behaviour have all been shown to have an influence on child eating behaviour and weight (Benton, 2004; Ventura & Birch, 2008). There is a body of research that has explored how maternal non responsive feeding styles such as pressurising children to eat, using food for non-nutritive reasons such as reward or to shape behaviour, and restricting intake particularly of palatable foods can increase risk of behaviours such as fussy eating, eating in the absence of hunger or unable to stop eating when full. In some cases this can increase or exacerbate child under or overweight. Conversely, responsive feeding interactions following child cues of hunger and satiety and offering and modelling a wide variety of healthy food options are associated with the most positive outcomes (Black & Aboud, 2011; Harbron, Booley, Najaar, & Day, 2013; Pinquart, 2014).

In the USA, research exploring these variables often considers variations between ethnic groups finding that those from ethnic minority backgrounds are often more likely to adopt feeding styles that are non-responsive (Cardel et al., 2012; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002; Worobey, Borrelli, Espinosa, Worobey, 2013). However, similar research in the UK is sparse and using research patterns from the USA where predominant ethnic groups are different and a greater proportion of the population is non-White compared to the UK is unlikely to offer strong generalisability (Blissett & Bennett, 2013). The findings revealed that Black

African Caribbean mothers were more likely to use restrictive feeding compared to White British and White German mothers. In the UK, one study found variation in maternal child feeding style for preschool children between ethnic groups, finding that mothers from Black and South Asian backgrounds were more likely to use pressurising feeding styles (Gu, Warkentin, Mais, & Carnell, 2017). Another found that mothers from South Asian backgrounds used high levels of pressurising styles but did not compare between groups (Fairley et al., 2015).

Aims of the thesis

Understanding how ethnicity might affect childhood overweight in the UK is an important issue, especially in developing interventions that are culturally specific and appropriate for different populations. Given the strength of the literature surrounding maternal perceptions, beliefs and interactions with child weight, and the paucity of research considering how this may vary between ethnic groups, the overall aim of this thesis was to explore whether differences in maternal child feeding style do exist between ethnic groups in the UK, and how and why they might affect child weight.

From a personal perspective, as a public-health practitioner, this question is of particular interest in understanding how we can better help families make healthy decisions for their children. I have always had an interest in understanding childhood obesity, and my professional role involves creating a supportive environment in which families can make healthy eating and lifestyle choices. As my professional career has focused on understanding the environment that surrounds the family itself, it is important to determine how factors such as ethnicity and cultural background may affect parents' perspectives and interactions with their children. If our interventions are to be truly evidence-based, the data that inform them must be collected with participants from as diverse backgrounds as possible to ensure that interventions are culturally appropriate and relevant.

A mixed-methods approach was selected to understand this issue from as many perspectives as possible. Mixed-methods approaches, which combine both qualitative and quantitative approaches, provide several strengths and are particularly useful in exploring influences on human behaviour. Broadly, quantitative elements allow behaviour to be measured, while qualitative elements allow these outcomes to

be explored in more depth (O’Cathain, Murphy & Nicholl, 2007). This combination allows the breadth and depth of a research question to be considered. For example, quantitative methods such as questionnaires allow for comparing large samples, while qualitative methods, such as interviews, can explore those issues in depth with a smaller number of participants. Findings from the two approaches can be triangulated, i.e., compared and used to corroborate findings across one study to another (Creswell & Clark, 2007).

However, a mixed-methods approach does pose challenges. One issue is that different research paradigms use different criteria to judge what is rigorous; thus, it can be difficult to balance these elements when combining the two approaches (Jones & Sumner, 2009). However, the approaches ultimately do share some underlying similarities. Although quantitative approaches are based on objective measures with clear-cut numbers, such as statistical tests of significance and reliability, while qualitative researchers seek to enhance the ‘trustworthiness’ of their research through aspects such as credibility, dependability, transferability and confirmability, both seek to enhance the rigour of their findings (Morrow, 2005).

Qualitative and quantitative approaches also have fundamental differences in terms of ontology (constructionism vs. objectivism) and epistemology (interpretivism vs. positivism) (Bryman, 2008). Ontology refers to different philosophical approaches concerning the nature of reality, while epistemology refers to how individuals understand how knowledge about this reality is developed. Qualitative research tends to take a constructionist and interpretivist approach, exploring the meaning and context of social phenomena, while quantitative research tends to take a more objective and positivist approach, measuring numbers and data (Corbin & Strauss, 2008). Guba and Lincoln (1994) argue that qualitative and quantitative research strategies refer to distinct and opposing paradigms, and as such are viewed as being incompatible.

A mixed-methods approach can also be time consuming and challenging due to researchers needing to familiarise themselves with and adopt the principles and methods of both approaches. Integrating findings can also be challenging due to the merging of different principles (Bryman, 2007; Johnson & Onwuegbuzie, 2004).

However, although challenging, combining the two approaches can provide rich data. For example, quantitative approaches can be used to measure differences in behaviour, and qualitative approaches can be used to understand why they are occurring (Bryman, 2008). Thus, given the nature of this research, a mixed-methods approach was deemed most suitable. Therefore, in a series of three interconnected studies, this thesis therefore examined whether

- a) Practitioners working in health and social care perceived maternal influences upon child weight to be an issue that was important and varied between ethnic groups
- b) Differences in maternal influences such as perceptions of child weight, maternal child feeding styles and maternal own eating behaviour could be identified between ethnic groups
- c) Social and cultural factors could explain why any such differences arose, and the barriers to promoting positive feeding interactions

To undertake this, the thesis begins with a narrative review of the literature, setting the research question within existing evidence. It presents three self-contained study chapters, before bringing together the findings and recommendations for practice and future research in an overall discussion chapter.

In order to conduct a comprehensive search on the relevant studies around the topic, it was crucial to identify what to search for and where to search. An expert librarian advised on the most useful databases to search. Search terms and combinations of search terms were used to obtain outcomes and for also focusing on the different comparison studies which reported on the general findings. The inclusion criteria involved literature in the English language. No other restrictions were placed on the data search. From this formulation, multiple databases were used to conduct the search: MEDLINE/PubMed, Web of Science, Health Management Information Consortium (Ovid), ProQuest Central, Web of Knowledge, Science Direct, EBSCOhost and Google Scholar.

The researcher used a number of key terms entered into the search engine including overweight, obesity, childhood obesity, ethnicity, ethnic minority, obese children, ethnic groups, parenting practices, feeding styles, eating behaviour, obesity implications, child weight, parental perceptions, and the causes of overweight. In addition, the researcher used the relevant critical appraisal tools in reviewing the research studies. These checklists described a useful tool as a means to check the rigour of different study designs involving the credibility and validity of the findings (CASP, 2013; Law, Stewart & Pollock, 1998).

Chapter 2

Literature Review

The subject of obesity and its implications for health and wellbeing is never far from media headlines, given its significant impact upon populations and economies. It is well established that adults who are overweight or obese are at an increased risk of a number of physical and mental health issues, with increasing understanding that childhood obesity is not only one of the greatest predictors of adult obesity but can also have a negative impact on health during childhood (Daniels, 2009). Obesity is now one of the largest modifiable influences on health related quality of life, with obese adults reporting far more unhealthy days compared to healthy weight adults (Jia & Lubetkin, 2005).

Obesity in adults is a major risk factor for chronic conditions including cardiovascular disease (CVD), type II diabetes, hypertension, hypercholesterolemia, certain types of cancer (colon, breast, endometrial, liver, esophageal and kidney), stroke, asthma, sleep apnea, musculoskeletal diseases (arthritis and chronic back problems), stomach ulcer, gallbladder diseases and chronic liver disease (Finkelstein, Fiebelkorn & Wang, 2003; Park, Falconer, Viner & Kinra, 2012). For example, obesity is associated with double the risk of heart failure compared to healthy weight (Kenchiah et al., 2002). Obesity is also thought to directly contribute to increased risk of cancers, approximately 14% of male and 20% of female cases of cancer (Calle, Rodriguez, Walker-Thurmond & Thun, 2003), having been implicated in having a causal influence in 39% of endometrial cancer cases, 37% for esophageal cancer, 25% for renal cancer, 11% for colon cancer, and 9% for postmenopausal breast cancer (Vainio, Kaaks, & Bianchini, 2002).

As a consequence of increased illness and associated costs, obesity also has a significant impact on economies. Globally, the impact of obesity has been calculated at over \$2.0 trillion (Bomberg et al., 2017). In the UK, the Health Select Committee (HSC) estimated that the total annual cost of treating overweight and obese people is around £6.6 - 7.4 billion. This equates to over 5% of the total NHS expenditure (Allender & Rayner, 2007). In terms of spending alone on diabetes, heart disease,

stroke and cancer, spending is estimated to reach of £2 billion by 2030 (Wang, Mcpherson, Marsh, Gortmaker & Brown, 2011). Similar costs are seen in the USA, with an estimated annual cost of medical obesity of over \$147 billion. On an individual level this equates to an average obese individual incurring \$1,429 in additional costs each year compared to a normal weight person.

Impact is however wider than this and lost earnings related to obesity are around estimated at over £2.3 billion in the UK. Obesity can impact upon ability to undertake work tasks, affect productivity and impair daily activities (Rodbard, Fox & Grandy, 2009). In addition, obese adults are up to 25% less likely to be employed compared to normal weight adults, more likely in those obese women than obese men (McCormick & Stone, 2007).

2.1 Childhood obesity

As noted above, childhood obesity is one of the strongest predictors of adult obesity, and therefore a predictor of associated adult illnesses. For example, Whitaker et al. (1997) demonstrated that after the age of 6, 50% of obese children would probably be an obese adult, while the probability was 10% for non-obese children. Children and adolescents whose weight reaches the 75th and above percentiles are more likely to be overweight (males) and obese (females) by the age of thirty five (Guo, Wu, Chumlea & Roche, 2002). In one longitudinal study, whilst just 10% of children with a normal weight developed obesity later in life, 77% of those with a BMI in childhood over the 95th centile were obese as adults (Freedman, Khan, Dietz, Srinivasan & Berenson, 2001). A further systematic review also found that an obese child is over five times more likely to be an obese adult, with adolescent obesity being a stronger predictor than childhood obesity. Here, 55% of obese children were obese as adults, compared to 80% of obese teenagers (Simmonds, Llewellyn, Owen & Woolacott, 2016).

Childhood obesity is therefore predictive of adult obesity related illness. In a systematic review, higher BMI in childhood was associated with a range of adult morbidities. Obesity in childhood predicted obesity-related morbidity in 31% of diabetes cases, 22% of hypertension and coronary heart disease (CHD) cases and 20% of cancers in adults (Llewellyn, Simmonds, Owens & Woolacott, 2016). A

further review found associations between childhood obesity and adult cardiovascular disease, hyperlipidemia, T2DM, gall bladder disease, osteoarthritis and cancers (Must & Strauss, 1999).

Obesity during childhood is significantly linked to many long-term adult complications. Examples are metabolic syndrome, obstructive sleep apnoea, non-alcoholic fatty liver disease, infertility, asthma, polycystic ovarian syndrome and psychiatric disease (Berentzen, Gamborg, Holst, Sørensen & Baker, 2014; Kelsey, Zaepfel, Bjornstad & Nadeau, 2014; Singer & Lumeng, 2017). Evidence from systematic reviews highlights that childhood obesity is an independent risk factor for adult mortality, metabolic syndrome, increased blood pressure, carotid intima thickness, diabetes and cardiovascular disease (Lloyd, Langley-Evans, & McMullen, 2010; 2012; Park et al., 2012).

However, rather than simply being a predictor of adult disease, childhood obesity is increasingly impacting upon health in childhood. Obesity related conditions such as type 2 diabetes, hypertension and elevated serum lipid and insulin concentrations that were once considered adult illnesses are now being seen in children (Decklebaum & Williams, 2001; Freedman, Dietz, Srinivasan & Berenson, 1999). For example, early indicators of cardiovascular disease are emerging in childhood and adolescence (Ingelsson et al., 2007). In the Bogalusa Heart Study morbidly obese adolescents presented with atherosclerotic lesions, which signify the beginning of damage to the arterial wall, in both the aorta and coronary arteries (McGill et al., 2001). Obesity in childhood (Steinberger & Daniels, 2003) and in adolescence (Yoshinga et al., 1995) is associated with an increase in left ventricular heart mass, which in turn is associated with high blood pressure and future heart disease (Daniels, Loggie, Khoury & Kimball., 1998). Obese children also have an increased association with atherosclerosis linked to intima-media thickness (IMT), impaired endothelial function and elevated levels of triglyceride levels – all of which are associated with heart disease (Meyer, Kundt, Lenschow, Schuff-Werner & Kienast, 2006).

Children who are obese are also at risk of obesity related illnesses during childhood. These include asthma (Reilly et al., 2003), sleep disordered breathing (Redline et al., 1999), and cardiovascular issues (Daniels, 2006; Weiss & Caprio, 2005). However,

despite their obvious importance, the implications of obesity for children are far wider reaching than cardiovascular disease and other physical illnesses. For example, research findings on obesity and quality of life (QOL) found that for severely obese children and adolescents aged 5 to 18 years, QOL was significantly lower in obese children compared to their healthy counterparts. This reached several domains of QOL including lower physical health, psychosocial health, emotional and social well-being and school performance (Schwimmer, Burwinkle & Varni, 2003). Obesity in childhood can therefore impact upon childhood experience, wellbeing and mental health in a number of ways.

2.1.1 Mental health

Children who are overweight or obese are more likely to experience mental health difficulties, specifically for depression and anxiety (Wang & Veugelers, 2008). Girls are more prone to developing difficulties compared to boys, in part due to social pressures around higher weight and body image for girls (Hill, 2011). Obesity can lead to lower self-esteem, stemming from social isolation, shaming or bullying, which consequently predicts poor child mental health (Wang & Veugelers, 2008). Obese children experience weight related stigma and bullying damaging self-esteem and increasing body dissatisfaction (Puhl & Latner, 2007).

For girls in particular, obesity can affect how many friendships they have and their positive exchanges. Cornette (2011) states that around 50% of boys and 58% of girls with obesity have problems with peer relationships; obese girls were more likely to be excluded, having rumours and lies spread about them. Self-esteem is central to protecting a child's social, emotional, behavioural and mental health and childhood wellbeing can therefore be significantly damaged by obesity (Cornette, 2011; Paradise & Kernis, 2002).

2.1.2 Ability to be active

Obese children are less likely to be physically active, although this association is bidirectional (Janssen, Katzmarzyk, Boyce, King & Pickett, 2004). This is affected by gender and age. Both boys and girls decrease in activity as they get older, but girls have a greater drop in activity levels compared to boys (Belcher et al., 2010). Obese children are spending more time in sedentary activities: watching TV and playing

video games, than doing exercise or physical activity (Caroli, Argentieri, Cardone & Masi, 2004). In part, lower activity levels are more likely to lead to obesity, but also obesity can impede upon activity levels. Children can be too unfit or embarrassed to take part in activities, further increasing the likelihood of them becoming obese (Maziak, Ward & Stockton, 2008).

2.1.3 School achievement

Obesity can also impact upon school achievement. Cornette (2011) found that obese girls in the 7th, 9th and 11th grades were much more likely to have been held back a year in school due to their poor academic achievement. Obese children and adolescents, specifically girls, are less likely to receive financial support for education from parents, and less likely to finish college; they are less likely as obese adolescent compared to normal weight to join prominent universities.

This is in part a wider social issue – obesity is tied to poverty (Goisis, Sacker & Kelly, 2015) which in turn is tied to educational difficulties (Cohen, Rai, Rehkopf & Abrams, 2013). However, issues with shaming, bullying and exclusion from friendship groups can affect how well a child achieves in school (Rothon, Head, Klinberg, & Stansfeld, 2011). Obesity can also lead to educational stigma. In one longitudinal study, children who gained weight from the fifth to eighth grades received reductions in teachers' ratings in reading and math, despite the absence of changes in standardised test scores (Kenney, Gortmaker, Davison, & Austin, 2015).

All of these factors highlight the importance of early intervention to prevent and reduce levels of childhood obesity.

2.2 How is obesity measured?

Overweight and obesity can be defined in different ways (Scarborough et al., 2010). The most common measure of weight status is BMI and is defined as weight in kilogrammes divided by the square of height in metres (kg/m²) (Roverts, Cavill & Rutter., 2009). The World Health Organisation classifies adults as overweight if their BMI is ≥ 25 to <30 and obese if it is ≥ 30 . However, using the same definition to measure overweight and obesity in infants and children does not work well. Unlike adults, children are still growing and variations in height will be seen by age, and

often by gender. Instead, specially designed growth charts are used to determine how a child's weight compared to expected norms for their age and gender (Cole et al., 2000).

2.2.1 UK growth charts

In the UK, the British 1990 growth reference (UK90) is commonly used to classify overweight and obesity in children. This tool was designed using data from children to determine typical height and growth by age and gender. It used a large nationally representative sample of British children (15,636 boys and 14,899 girls) aged between 33 weeks of gestation and 23 years. The UK90 chart is composed of a paramount of smooth curves representing the distributed measurement of interest by both weight and height, according to the reference population represented by curves plotted versus age.

Using this tool children are weighed and plotted against a centile chart for their age and gender. This centile chart identifies the expected weight ranges for children, splitting them into underweight, normal or healthy and overweight. It consists of nine centile lines (0.4th, 2nd, 9th, 25th, 50th, 75th, 91st, 98th and 99.4th) (Cole & Freeman & Preece, 1995). A child whose weight is on the 3rd centile will be classified as underweight, whilst a child on the 85th percentile and above, overweight. Those whose weight falls on the 95th centile and above will be categorised as obese (Gatineau & Mathrani, 2011b).

Measuring child weight in this way is a fairly reliable indicator and is used in clinical, public health and community-based programmes, partly because it is an easy measure of weight and height; it is not expensive and is easily understood by practitioners (Himes, 2009). However, it measures weight relative to height rather than measuring adiposity. Therefore, the BMI can create large errors of body fatness estimation due to the fact that the BMI cannot distinguish between body fatness, muscle mass and skeletal mass (Prentice & Jebb, 2001).

Other measurements such as the Waist-to-Height Ratio (WHtR) have also been used to measure overweight in children. WHtR is an indicator of abdominal obesity and is more strongly associated than BMI to metabolic complications (Kahn, Imperatore,

Cheng, 2005). However, there is greater potential for error using this method, with often little additional benefit over simple height and weight measures unless a child has a lot of muscle tissue (Freedman & Sherry, 2009).

Skinfold thickness tests can also be used, taken by pinching up a fold of skin and subcutaneous tissue and measuring the thickness with a calliper (Tanner & Whitehouse, 1975). Skinfold thickness measures body fat at various points of the body, most commonly the triceps and subscapular. Carrying out a skinfold thickness measurement is fairly cheap and simple. However, it does require the subject to partially undress in order to measure them (Power, Lake & Cole, 1997). Skinfold thickness allows body fat to be measured rather than simply weight and can therefore be more predictive of health issues (Freedman & Sherry, 2009). However, measurements should be taken by trained examiners to avoid misinterpretations, or errors (Wang et al., 2003).

Finally, Dual energy X-ray absorptiometry (DXA) was created to assess total and regional body composition including the estimation of lean soft tissue mass, bone mineral mass, bone-free fat mass (FFM) and fat mass (McGuire & Ross, 2010). Body composition is measured by assessing the attenuation of X-ray emitted using pencil or fan-beam technology at two energy levels. There are disadvantages of using DXA for measuring fat and FFM may be affected by the scanner type, software (algorithms), sagittal diameter, hydration status, thickness of tissue and the size of the subject being measured. It is difficult to differentiate visceral fat and subcutaneous fat as DXA assesses body composition two dimensionally (McGuire & Ross, 2010; Tyler & Fullerton, 2008). However, two methods of assessment can provide more detailed information on total abdominal fat and FFM; these are computed tomography (CT) and magnetic resonance imaging (MRI) (Lee & Gallagher, 2008; McGuire & Ross, 2010). Also, DXA may overestimate the percentage of body fat in a subject with higher body fat, or underestimate body fat in a subject with lower body fat (McGuire & Ross, 2010).

Overall, measuring childhood overweight and obesity can be complex due to changes in children's growth and development as they pass through infancy, childhood and adolescence. Likewise, increased in body fatness during puberty may temporarily

classify a child as overweight, without any impact on their long term health (Demerath et al., 2006). However, generally measures of childhood overweight form a useful tool for identifying children at risk of health and wellbeing issues.

2.2.2 How many adults and children are overweight or obese?

The prevalence of obesity has tripled worldwide since 1975 with 1.9 billion more adults in 2016. Among obese adults, over 650 million adults aged 18 years and over were classified as obese. Overall, more than 13% of the world's adult population is classified as obese (WHO, 2017). In the UK, the Health Survey for England (HSE) reveals that the proportion of obese people increased between 1993 from 15% to 27% in 2015; around 68% of men and 58% of women were overweight or obese in 2015 (Department of Health, 2017b). The Welsh Health Survey (WHS) in Wales reveals that the prevalence of overweight and obesity was around 63% for men and 56% for women in 2015 (Baker, 2017).

In the USA, the latest data on obesity prevalence from the National Health and Nutrition Examination Surveys (NHANES) showed that 39.8% of adults in 2015/16 were obese (Hales, Carroll, Fryar & Ogden, 2017). The latest data from the Australian National Health Survey (NHS) on overweight and obesity states that in 2014/15, the estimated prevalence of overweight and obesity in adults was around 11.2 million – 63.4% in total, with numbers of overweight people at around 6.3 million – 35.5% – and 4.9 million – 27.9% – for obese adults (Australian Bureau of Statistics, 2015). In Europe, the latest data from the European Social Survey on adults showed that overweight and obesity prevalence in the European Union (EU) stood at 53.6% in 2014 (Marques, Peralta, Naia, Loureiro & Matos, 2017).

Whilst global levels of overweight are similar for men and women (39% versus 40%), 11% of men are considered obese compared to 15% of women (WHO, 2017). In England in 2015, 68% of men were considered overweight or obese, compared to 58% of women. Approximately 27% of both genders were obese (Baker, 2017). In Australia in 2014/15, 70.8% of men were considered overweight or obese compared to 56.3% of women (Australian Bureau of Statistics, 2015). In the USA, the obesity rate was approximately 39.8% among adults, 38.0% for men and 41.5% for women

(Hales et al., 2017). Finally, across Europe, the prevalence of overweight and obesity in 2014 was 44.7% for men, compared to 30.5% for women (Marques et al., 2017).

2.2.3 Obesity prevalence in children

The prevalence of obesity worldwide in children under the age of 5 years was 41 million in 2016. Over 340 million children aged 5 to 19 were overweight or obese in 2016. Also, among children aged 5 to 19, the prevalence has increased from 4% in 1975 to 18% in 2016. In 2016, 18% of girls were overweight or obese with around 19% overweight or obese boys (WHO, 2017).

In the UK, obesity prevalence among reception children decreased from 10% in 2006/7 to 9% in 2015/16. However, the prevalence among year 6 increased from 17% in 2006/2007 to 20% in 2015/16 (DH, 2017b). In Wales, according to the Child Measurement Programme for Wales (CMPW), the prevalence of overweight and obese children in reception (aged 4-5 years) was 26.2% and overweight and obese children in year 6 were 18.6% and 34.1% respectively (Public Health Wales, 2017). The prevalence of overweight and obese children was higher in Wales at 26.2% compared to 22.1% in England for this group (Public Health Wales, 2017).

In the USA, obesity prevalence in children and adolescents aged 2-19 was 18.5% in 2015/16 (Hales et al., 2017). The level of obesity prevalence was higher among adolescents aged 12-19 years at around 20.6% compared to both school aged children of 6-11 years at around 18.4%, and preschool children aged 2-5 years at 13.9% (Hales et al., 2017). According to the National Survey of Children's Health, in 2016, around 31.2% of children aged 10 to 17 were overweight or obese. Conversely, in 2014/15, the prevalence of overweight and obesity in Australia among children and adolescents aged 2-17 was 27.4% was lower, with the overweight percentage around 20.0% and at 7.4% for obese children (Australian Bureau of Statistics, 2015).

Rates of overweight and obesity amongst boys are slightly higher than amongst girls. In the UK, amongst reception children, 22.7% of boys were overweight or obese compared to 21.5% for girls. In year 6, the overweight and obese boys were 36% compared to 32.3% of girls (Baker, 2017). In the USA, the prevalence of obesity was higher in school aged boys at around 20.4% compared to pre-school boys at 14.3%.

A similar pattern was also found in adolescent girls aged 12-19 with the rate at 20.9% compared to pre-school aged girls at around 13.5% (Hales et al., 2017).

2.2.4 Ethnicity and obesity

Aside from age and gender, one of the biggest variants in obesity rate across the globe is for ethnicity. For example, in the UK Health Survey for England (2004), obesity for women was most prevalent among Black African (38%), followed by Black Caribbean (32%), Pakistani (28%), with a far lower level amongst Chinese women at 8%. For men, the obesity level was highest amongst both Black Caribbean and Irish men with a similar value of 25%, with Chinese men four times less likely to be obese than men in the general population (Sproston & Mindell, 2006).

Further research in the UK has shown that South Asian and Black adults are more likely to have a higher BMI than White British adults, with those from Chinese backgrounds having the lowest levels. A systematic review of 29 studies showed that South Asian adults in the UK have a higher risk of obesity, based on measurements of height, weight, waist circumference, hip circumference, waist-hip ratio, sub-scapular and suprailiac skinfolds, abdominal diameter, and sub-scapular/triceps skinfolds, compared with those of Caucasians (El-Sayed, Scarborough & Galea, 2011).

Likewise, in the USA, one study found that obesity prevalence by ethnicity was highest in Hispanic (47%), and non-Hispanic Black (46.8%) compared to non-Hispanic White adults (37.9%) (Hales et al., 2017). This is reflected in an earlier analysis of the dataset in the USA, which found that 30% of non-Hispanic White adults were considered obese, 36.8% of Mexican Americans, and 45.0% of non-Hispanic Black adults (Ogden et al., 2006). Similar findings in other studies reveal higher rates of both overweight and obesity amongst Black American and Mexican American men and women (Wang & Beydoun, 2007).

Similar patterns are also seen in Australia. Relative to Australian-born individuals, obesity prevalence was higher in two groups: adults from North African/the Middle East and Oceania regions; specifically amongst males, obesity prevalence was also lower in Asian adults (North East and Southern Asia) compared to Australians

(Menigoz, Nathan & Turrell, 2016). The trend of obesity prevalence was also higher amongst Pacific Islanders and those of Middle Eastern/Arabic background compared to Australians, more amongst boys (7.7%) than girls (5.7%) (O'Dea, 2008).

A similar pattern is seen amongst children. The National Child Measurement Programme (NCMP) was launched in 2005/06 and weighs and measures every child in reception (aged 4-5) and in year 6 (aged 10-11). In 2011, 2013, 2015 and 2017 children from South Asian and Black backgrounds were significantly more likely to be overweight or obese compared to those from White British backgrounds. Meanwhile, children from Chinese backgrounds were the least likely to be overweight or obese (DH, 2011; 2013; 2015; 2017a). For example, in 2017, obesity prevalence was highest in both reception and year 6 for Black ethnic groups at around 14.8% and 29.5% respectively. The next highest prevalence was amongst South Asian ethnic groups at approximately 9.9% in reception and 25.2% in year 6. The prevalence then was 9.1% for White and 5.8% for Chinese children in reception. For children in year 6, the rates were 19.8% amongst Chinese children followed by 18.1% for the White group (DH, 2017a).

A comparison has been prepared since NCMP launched in 2006/7 and the latest 2015/2016 revealed that, after adjustment of ethnicity and deprivation, there has been a significant decrease in the obesity trend for boys in reception while there has been a significant increase in the obesity trend amongst year 6 girls. However, the trend of excess weight has increased in Bangladeshi boys followed by Black African, Indian, Pakistani and White individuals. Comparatively, for girls, excess weight has increased amongst Bangladeshi, then Black African, Indian, Pakistani, Black Caribbean and White individuals (Public Health England, 2017). Percentage-wise, in 2017, the results have shown increases in obesity prevalence for both children in reception and year 6, for Black children (14.8 %) in reception and 29.5% in year 6 while South Asian children had rates of 9.9 % and 25.2% in reception and year 6 respectively. Comparatively, in 2015, obesity prevalence was higher for Black children in reception (15.2%) and (28.6%) in year 6 while in South Asian children the percentage was 9.6% in reception and 24.5% in year 6. Both White and Chinese groups have lower levels of obesity compared to the other two groups; the Chinese group was even lower specifically in reception than the White British group.

These data are not in isolation. Research outside the NCMP also shows the same pattern, even after adjusting for confounding factors such as socioeconomic status groups (Connelly, 2011; Cronberg, Wild, Fitzpatrick & Jacobson, 2010; El-Sayed, Scarborough & Galea, 2011). For example, the findings from the Millennium Cohort Study (MCS), which involved 13,800 families in the UK, reported differences in those who were overweight or obese based on ethnic groups. The results found that children from South Asia (Pakistani or Bangladeshi origin) were more likely to be obese, while children from Black ethnic groups were more likely to be overweight (Connelly, 2011). However, the data largely were based on self-reporting, which may have led to biased data. The data lack a detailed representation of what the children eat, how they eat, and in what quantities, which are important factors in determining childhood diet, as required in the analysis of obesity. UK regional data from London has also demonstrated differences in obesity prevalence according to ethnic background. In both reception and year 6, the Black ethnic group had higher obesity rates compared to White children, while the South Asian group also had higher rates of obesity as the risk increased with deprivation in boys more than in girls (Cronberg, Wild, Fitzpatrick & Jacobson, 2010).

Significant differences in childhood obesity between ethnic groups are also found in other countries. For example, in the USA, results from the 2009/10 National Center for Health Statistics showed obesity prevalence to be significantly higher among Mexican American boys (aged 2 to 19 years) than non-Hispanic Black and White boys. Among girls, non-Hispanic Black children were significantly more likely to be obese compared with Mexican American and non-Hispanic White girls (Fryar, Carroll, & Ogden, 2012). In the Early Childhood Longitudinal Study, Birth Cohort, a nationally representative sample of US children born in 2001, the obesity rate was 18.4% overall. Those from American Indian/Native Alaskan had a rate of 31.2%; Hispanic, 22.0%; non-Hispanic Black, 20.8%; non-Hispanic White, 15.9%; and Asian, 12.8% (Anderson & Whittaker, 2009). Another study found in the USA, a rate of obesity highest amongst Hispanic children (25.8%), and non-Hispanic Black children (22%) compared to non-Hispanic White children (14.1%) and Asian children (11%) (Hales et al., 2017). Similarly, in Australia, greater obesity prevalence by ethnic groups has been shown among children from Pacific

Islander/Polynesian, Middle Eastern, Southern European and aboriginal ethnic groups (O'Dea & Dibley, 2014).

2.2.5 Ethnicity and limitations of BMI

Data consistently shows that in the UK and other countries, variations can be seen in the risk of overweight and obesity for children between different ethnic groups. However, it should be remembered that BMI and body fat are not the same. This is important because different ethnic groups differ in body composition and fat distribution. At any given BMI, Black adults and children tend to have less body fat and less central adiposity than other ethnic groups. Meanwhile, children and adolescents of South Asian origin have a higher fat mass index or body fat and more central adiposity for a given BMI compared to White European origin (Aloia, Vaswani, Mikhail & Flaster, 1999; Deurenberg, Deurenberg-Yap, Flegal et al., 2009; Gallagher et al., 1996; Guricci, 2002; Nightingale, Rudnicka, Owen, Cook & Whincup, 2011; Shaw, Crabtree, Kibirige & Fordham, 2007; Viner et al., 2010).

Fat distribution may also be different. White American men and women are more likely to have excess abdominal fat compared to Black American men and women (Conway, Yanovski, Avila & Hubbard, 1995; Hill et al., 1999). This is important as it could affect how many children are deemed to be overweight when they may not have excess fat (Deurenberg, 2001), especially given that some research has suggested that the relative risk of being rated as overweight may be lower for Black American men and women because of this lower body fat content (Abell et al., 2008; Sanchez, Reed & Price, 2000; Stevens et al., 1998) although further research is needed.

Fat type may also matter. Adipose tissue mass has three different compartments in the human body; superficial subcutaneous adipose tissue (SSAT), deep subcutaneous adipose tissue (DSAT) and visceral adipose tissue (VAT). Comparison to South Asians, White Caucasians have a larger superficial subcutaneous adipose tissue (SSAT) compartment that prevents them from developing early obesity (Sniderman, Bhopal, Prabhakaran, Sarrafzadegan & Tchernof, 2007). This result indicates that, in terms of excess energy, SSAT could be the first to increase in size and then the other

two compartments in South Asians causing them to be more prone to overweight than White people.

A similar pattern was also seen in children; White children in the UK, when compared to Indian children, were found to have higher BMIs but less adiposity (D'Angelo et al., 2015; Lakshmi et al., 2012). In a cross-sectional study of 5,887 children ages 9 to 10, South Asian children had higher adiposity levels as measured by skinfold tests and fat-mass percentage than White Europeans, yet their BMI was, on average, lower. Conversely, Black Caribbean children had a higher BMI than White European children, yet their skinfold measures were lower (Nightingale et al., 2011). Thus, measuring BMI levels may underestimate adiposity in South Asians or overestimate it in people who are Black Caribbean.

2.2.6 Why might obesity differ between ethnic groups?

A key question therefore arises – why might such consistent findings be occurring in rates of childhood obesity between ethnic groups? On a simple level, childhood obesity is caused by an imbalance between energy intake and energy needs. Consume too many calories or fat and a child will gain weight, whilst too few will lead to underweight (Sahoo et al., 2015; Uzogara, 2016). On average, the recommended daily intake of calories for children aged 7-10 years old varies slightly among boys and girls ranging from the lowest in girls at around 6400kJ/1530kcal up to the highest level in boys at 8500kJ/2032kcal (National Health Services, 2015). Consuming higher levels of calories than needed, if not balanced by increased energy expenditure can put individuals at risk of overweight.

Food choices matter. As a simple overview, children who eat higher levels of energy dense foods are more likely to be overweight (Johnson, Mander, Jones, Emmett, & Jebb, 2008; Swinburn, Caterson, Seidell, & James, 2004). This includes drinks, and children who consume high levels of soft drinks are more likely to be overweight due to their high calorie and sugar levels (Grimm, Harnack, & Story, 2004). There is also a relationship with nutrient intake. Children who eat a more varied diet, with increased levels of fruits, vegetables and fibre are also less likely to be overweight, in part due to the bulky nature of these foods by their energy density (Lin & Morrison, 2002; Tohill, 2005).

Obesity is also not only about what a child eats, but how a child eats it. Eating behaviour is an important part of weight regulation. In particular, a child's ability to be satiety responsive (to stop eating when they are full) and to be low in food responsiveness (eating in response to food cues regardless of hunger) is an important part of being a healthy weight. Children low in satiety responsiveness and high in food responsiveness are more likely to be overweight (Carnell & Wardle, 2008; Jansen et al., 2012; Webber, Hill, Saxton, Van Jaarsveld & Wardle, 2009).

Conversely, food fussiness (eating a limited amount of food types, often in particular few vegetables) can lead to underweight due to food avoidance (Sleddens, Kremers & Thijs, 2008). However, it can also increase obesity risk as it can lead to a greater intake of 'junk foods' high in calories and fat (Nicklaus & Remy, 2013; Tharner et al., 2014). Promoting healthy eating behaviours in early childhood is important due to their tendency to be stable over time (Ashcroft, Semmler, Carnell, Van Jaarsveld & Wardle, 2008).

Children who do less physical activity are also less likely to be overweight or obese. The recommended activity level for children aged 5-17 years old is 60 minutes of moderate to vigorous intensity physical activity every day (WHO, 2018). Globally, in 2010, approximately 81% of children aged 11-17 were insufficiently physically active. Boys were more physical active than girls, around 22% of boys and 16% of girls meeting the WHO recommendations for physical activity levels. Not undertaking sufficient activity to balance energy intake can therefore put an individual at risk of overweight.

However the relationship between food, activity and individual needs is far more complex than that. Numerous factors determine a) how much energy a child needs, b) their intake of food, and c) their activity level. These factors are heavily embedded within wider psychosocial, cultural and economic contexts (Biddle, Gorely & Stensel, 2004; Caprio et al., 2008; Nestle et al., 1998; Ogbu, 1981).

Broadly speaking influences on childhood obesity can be classified as biological (nature) and environmental (nurture) or in other words internal physiological factors that are more difficult or impossible to change, compared with life experiences that

affect a child's diet and activity levels. The interplay between biology and the environment will also determine how likely a child is to become overweight. For example, a child who is at low genetic risk of becoming overweight will not be so likely to do so on the same diet and activity levels of a child who is predisposed genetically to obesity (Carnell & Wardle, 2008; Llewellyn & Wardle, 2015; Wardle, Carnell, Haworth & Plomin, 2008). Understanding how these factors influence obesity is critical to understanding how to best support families.

2.2.7 Understanding influences on obesity from a theoretical perspective

Understanding the influences on obesity is therefore a complex topic. From a theoretical perspective, the Ecological Systems Theory (EST) (Bronfenbrenner, 1986) is a useful model in understanding how numerous different layers of influence (that also interact with each other) can affect an individual.

Ecological systems theory

Ecological Systems Theory is a complex hierarchical of multiple interactive systems that form the frameworks of human development. Human behaviour is formulation of individual action and the environment over time. The Ecology of human development defined by Bronfenbrenner as 'the scientific study of the progressive, mutual accommodation, throughout the life span, between a growing human organism and the changing immediate environments in which it lives, as this process is affected by relations obtaining within and between these immediate settings, as well as the larger social contexts, both formal and informal, in which the settings are embedded' (Bronfenbrenner, 1977, p. 51). This theory is constructed upon four layers of environmental levels of influence; microsystem, mesosystem, exosystem and macrosystem (see figure one).

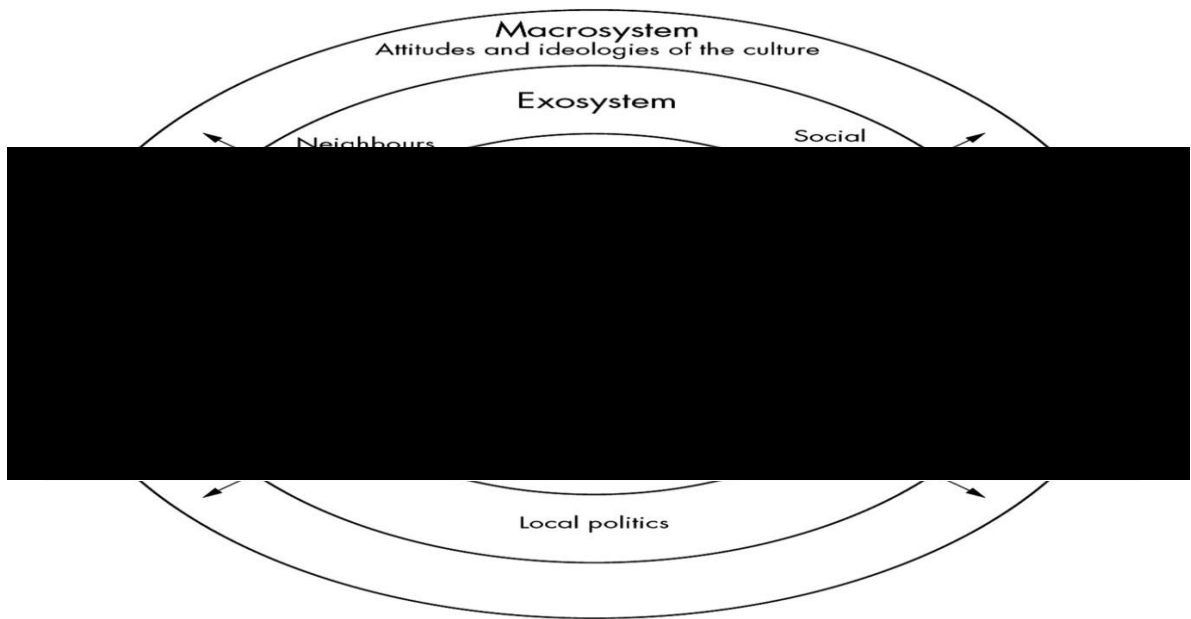


Figure One: Bronfenbrenner's Ecological Systems Theory (1977)

Adapted from Vélez-Agosto et al. (2017)

The individual in the centre is affected by their own biological factors such as sex, age and general health. However, they are also affected by the attitudes, beliefs and behaviours of those around them in their everyday lives such as those in their family, their peers, school friends or those in health or caring roles. This layer is called the microsystem. However the factors in the microsystem do not exist in isolation. They can interact with each other, and are also affected by broader cultural factors. This interactive layer is known as the mesosystem.

Another layer of influence is the broader, social and cultural factors in which an individual lives. This layer includes factors like social economic status, ethnicity, industry, and the environment and is known as the exosystem. Finally, the macrosystem refers to the broader culture and patterns of social norms and traditions affect behaviour.

The Ecological Systems Theory model can easily be applied to understanding the influences upon child weight (see Figure 2). For example, although individual biological factors can affect weight, individuals are also directly affected by the environment in the context of the attitudes and behaviours of those around them,

such as family and friends. Multiple layers of the environment shape and influence child development.

Immediately around the child, at the microsystem level, the child's parents, family, friends, school and neighbourhood can all impact upon the child and therefore weight. For example, parental preferences and behaviours, school messages, and attitudes of friends can all affect what a child eats and how active they are. These factors are interacting with each other, creating the mesosystem.

Exosystem factors – wider, structural influences such as parent's workplace, socioeconomic status, neighbourhood status and political influences – can also affect child weight. Finally, broader cultural attitudes and beliefs towards weight and eating behaviour at the macrosystem also play a role. Ethnicity is identified as one such macrosystem factor.

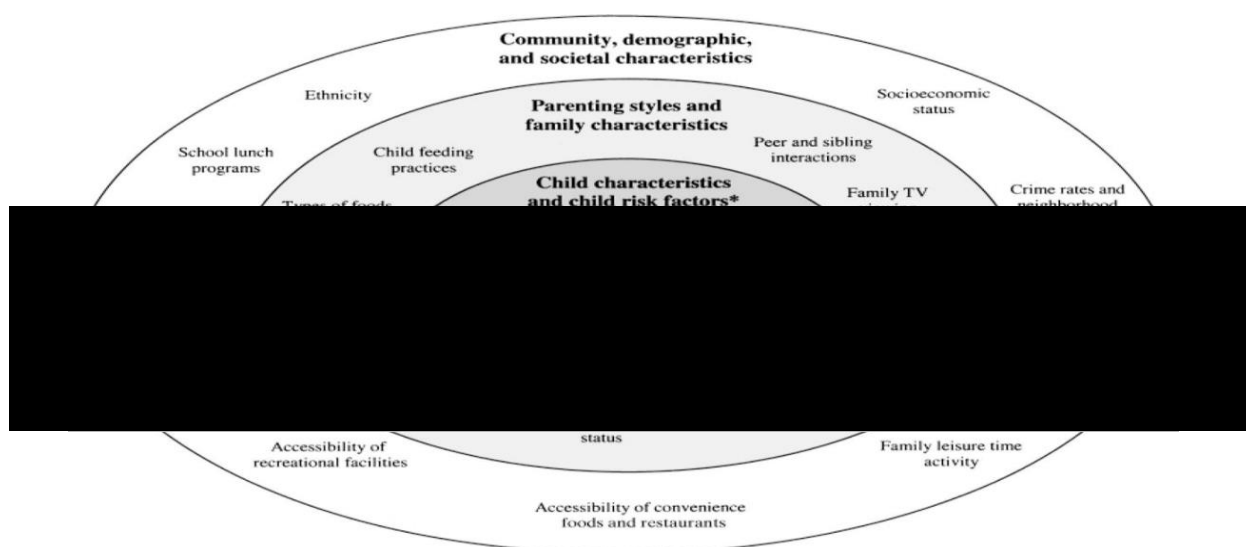


Figure Two: Ecological Systems Theory model for child weight

Bronfenbrenner (1986) adapted from Davison and Birch (2001)

Ecological systems theory, therefore provides a good model for describing how multiple influences can affect child weight (Darling, 2007; Skelton, Buehler, Irby, & Grzywacz, 2012).

The model contains some limitations. The model does not consider how much influence or power each of these factors possesses, presenting them as factors that

could influence outcomes for a child, but not considering which may be the largest or strongest, or how this may differ between contexts. For example, does industry exert a larger influence than schools? How and at what stage of a child's life? It is important to understand the relative weighting of these influences upon a child, which the model does not allow (Houston, 2017). The mechanisms concerning how these influences shape an individual are also not clear. The model highlights, for example, one influence between the media and the child, but not how this influence affects child outcomes (Harry, 1996).

However, the model's strengths make it particularly well-suited to understanding this research question. These strengths lie in highlighting not only how multiple layers of influence affect a child, but also how these layers interact with each other. It considers how factors on one layer may mediate or moderate factors on another level, e.g., how media may affect a young child directly only if his or her parents allow media messages to reach that child (Davison & Birch, 2001). It is a particularly good model for understanding obesity, as it shows just how complex obesity's influences can be. The model highlights child risk factors in relation to different influences, including child characteristics, parenting styles and family characteristics, as well as peer-related, community and demographic characteristics. It provides a holistic example on how risk of childhood overweight and obesity is affected by a number of complex factors surrounding the child including at the familial and societal level.

Multiple factors can therefore influence whether a child becomes overweight and significant research has been conducted globally into understanding these influences. Given the established relationship between childhood obesity and ethnicity in the UK, it could be assumed that significant research would have been conducted that explores its causation. However, despite a large body of evidence examining influences upon obesity in general populations, much of this research is often focussed upon primarily White samples. This significantly affects its generalisation across an increasingly diverse population and leaves a gap in understanding how health and social care practitioners can best support families from non-White backgrounds.

When research does take into consideration ethnic differences, it is often conducted in other countries, predominantly the USA. Although concepts can be drawn from this data, making direct comparisons is difficult and likely to be inaccurate, due to large differences in population make up in the UK and USA. This means there are major limitations in transferring data collected in the USA to the UK. To understand this, we need to consider the diversity of the UK population, particularly in relation to the USA.

2.2.8 Ethnicity in the UK versus the USA

The UK's population in 2016 was 65.6 million. According to census data (2011) on ethnic groups, the largest ethnic group was White British at 86%, followed by the Asian/Asian British group, which constitutes 7.5% (Indian, Pakistani, Bangladeshi and Chinese), the Black African Caribbean or Black British group at 3.3%, and then the mixed group at 2.2% and others at 1.0%. The South Asian ethnic group was the largest ethnic minority group, with Indians and Pakistanis accounting for 2.5% and 2.0% of the total, respectively, thus making India and Pakistan the most common non-UK countries of birth (India, Pakistan). The remaining groups of minority ethnic groups are categorised as 'other' that account < 0.5 % with a total of 1.4% of the UK population. Over half of the category 'other' consists of people born in Far Eastern countries such as, Philippines, Japan, Thailand and Vietnam (Gardener & Connolly, 2005).

These figures are significantly different, both in type and number, to population statistics in the USA, meaning that drawing parallels with US research that considers differences in ethnicity is unlikely to be accurate. In the USA, 76% of the population are White. In 2010, Black African and Asian groups make up the largest non-White, with approximately 17% of the White population identifying as Hispanic or Latino (United States Census Bureau, 2011). Therefore, not only are there significant differences in the proportion of the non-White population in the UK and the USA, but the main ethnic groups are different too.

These, of course, are not the only differences between the USA and the UK that might affect health and wellbeing. Significant differences occur in delivery of healthcare which could affect weight and eating behaviour, and more generally wider

health and wellbeing. The US healthcare system is made up almost entirely of private sector providers and is financed through private health insurance, while in the UK, around 90% of health care is financed and provided by the government through tax payments (Kulesher & Forrestal, 2014; Reid, 2010).

Therefore, although research showing differences in childhood obesity between ethnic groups in the USA is important in raising potential influences, research also needs to be conducted in UK settings.

Using the Ecological systems model to understand influences on childhood obesity and their variation by ethnicity

Understanding why children from different ethnic backgrounds in the UK have varying risks of overweight is important in developing interventions tailored to supporting healthy weight and activity in different groups. The Ecological systems model approach will now be used to consider how factors at the individual, micro, and macro system levels can affect child weight, and whether research has been done in the UK considering how these factors differ between ethnic groups. Further details of these UK based studies – their specific methodology, sampling, results and limitations can be found in a critical analysis table in Appendix (1A).

2.3 Factors at the individual child level

Research in the UK has explored a number of influences on child weight at the individual level between ethnic groups. These include dietary influences, activity, and genetic factors.

2.3.1 Dietary influences and obesity

As noted above, children who eat higher levels of high fat, high sugar foods are more likely to be overweight (Fox, Pac, Devaney & Jankowski, 2004; Savage, Fisher & Birch, 2007; Ziegler, Briefel, Clusen & Devaney, 2006). Fast food consumption, ready prepared meals, and a greater proportion of meals eaten outside the home is also predictive of overweight (Young & Nestle, 2002). Conversely, a balanced diet, high in intake in fruit and vegetables is associated with decreased risk of overweight (Cullen et al., 2004).

Patterns of dietary intake differ between ethnic groups in the UK, with research showing the children from Black Caribbean, Black African and Pakistani backgrounds have unhealthier eating patterns than White British children. Children from ethnic minority groups are more likely to miss breakfast, consume soft drinks daily and are less likely to consume the recommended amount of fruits and vegetables compared to White British children (Maynard, Baker, Rawlins, Anderson, & Harding, 2009). This was echoed in another study that found Black Caribbean, Black African and Pakistani girls were more likely to miss breakfast, eat fewer portions of fruits and vegetables and drink more soft drinks compared to White girls (Harding, Teyhan, Maynard & Cruickshank, 2008). Fat intake has also shown to be higher in South Asian children, particularly of Bangladeshi origin, compared to White British children, but lower in Black African and Black Caribbean children. Fruit and vegetable intake is also lowest in South Asian children (Donin et al., 2010).

In the USA, Hispanic children have a higher consumption of fruit, vegetables, dark greens, orange vegetables, legumes, meat, beans and sodium compared to Black children (Hiza, Casavale, Guenther & Davis, 2013). Further research has shown that Black and Hispanic children higher intake of food that is high in calories, but low in nutritional content than White American children (Taveras, Gillman, Kleinman, Rich-Edwards & Rifas-Shiman, 2010). Further research shows that children from Black African backgrounds have a higher intake of sweetened drinks compared to White children, compounded by increased levels of low income (Salvo, Frediani, Ziegler & Cole, 2012). However, research comparing White Hispanic and White non-Hispanic children finds that Hispanic children often consumed greater amounts over all of cholesterol and fibre like eggs and fresh meat, calcium, vitamin D and potassium compared to non-Hispanic Whites and had a lower intake of added sugars (Eicher-Miller, Fulgoni & Keast, 2015).

2.3.2 Early nutrition and obesity

How an infant is fed in the early months of life can also affect obesity risk. Breastfeeding reduces a child's overweight by 15-30%, with a greater potential reduction achieved with a longer duration of breastfeeding and exclusive breastfeeding (Arenz, Ruckerl, Koletzko, & von Kries, 2004; Armstrong & Reilley,

2002; Harder, Bergmann, Kallischnigg, & Plagemann, 2005; Singhal & Lannigan, 2007).

Breastfed infants are less likely to be overweight for a number of reasons. Breastfed infants consume fewer calories and drink less quickly (Bartok & Ventura, 2009). Content of the milk also matters. Formula milk is higher in protein (Larnkjaer, Hoppe, Mølgaard & Michaelsen, 2009), which is associated with an increased risk of overweight (Ailhaud et al., 2006). Breast milk also contains bioactive properties which formula milk does not (Read, Penttila, Howarth, Clarke & Regester, 2002). Factors such as leptin and grehlin may help the baby regulate their appetite (Aydin et al., 2008). Breastfed infants have greater opportunity for self regulation as they are in charge of intake, rather than it being visible in a bottle (Brown & Lee, 2013). Mothers who formula feed are more likely to try and encourage their infant to consume a greater intake of milk or to finish a feed (Brown, Raynor & Lee, 2011), potentially breaking down infant ability to be satiety responsive (Brown & Lee, 2012).

Babies who are breastfed are also less likely to be fussy eaters as toddlers, accepting a wider variety of foods (Brown & Lee, 2012; Hausner, Nicklaus, Issanchou, Mølgaard & Møller, 2010). This may be because flavours in food pass into the mother's milk, flavouring the milk and introducing tastes to the baby. They then recognise these tastes when given them as solid foods (Cooke & Fildes, 2011; Wardle et al., 2003).

Timing and type of solid foods can also affect risk of obesity and overweight. Infants who are introduced to solid foods before three months are more likely to be overweight (Grote et al., 2011; Kalies et al., 2005). Another study found that those introduced to solids before four months were more likely to be obese than those introduced after six months (Huh, Rifas-Shiman, Taveras, Oken & Gillman, 2011), although not all research is conclusive. One reason for this is that infants introduced to solid foods before the recommended six months of age have a higher protein intake than those introduced later, especially if they are formula fed (Seach, Dharmage, Lowe & Dixon, 2010). Babies are also often given solid foods early in

order to get them to take in more calories, in a belief that this will help them sleep or be more settled (Brown & Rowan, 2015).

How babies are introduced to solid foods might also affect their weight gain and eating behaviour. Responsive feeding during the period babies are introduced to solid foods has associated with lower weight gain and increased satiety responsiveness (Brown & Lee, 2015), although further research is needed. Limited research suggests that allowing a baby to self-feed from introduction of solids might reduce the risk of obesity of toddlers and preschool children, as they are able to eat at their own pace (Brown & Lee, 2015; Townsend & Pitchford, 2012). However, much of the research in this area relies on self-report, whilst a randomised controlled trial found no reduced risk of overweight at twelve months between infants who fed themselves or were spoon-fed (Taylor et al., 2017). However, this research relied on an earlier time period and further research is needed (Lakshman, Clifton & Ong, 2017).

Research examining ethnic variations in early feeding shows an interesting pattern. In the UK mothers from Black, South Asian and Chinese groups are all significantly more likely to initiate breastfeeding and breastfeed for longer compared to White British mothers. Whereas breastfeeding initiation in these groups was over 92%, initiation amongst White women was over 10% lower (McAndrew et al., 2012). Conversely, in the USA, women from black backgrounds are less likely to breastfeed than White mothers (Johnson, Kirk, Rosenblum & Muzik, 2015).

However, although mothers from Black and South Asian backgrounds in the UK are more likely to breastfeed, they are also more likely to introduce foods other than milk in the early days and weeks, and whilst they breastfeed for longer, are less likely to do so exclusively (McAndrew et al., 2012). Similarly, in the USA, mothers from Black and Hispanic backgrounds introduce solid foods earlier than White American mothers (Taveras et al., 2010).

2.3.3 Activity levels and obesity

Children who engage more frequently in physical activity are less likely to be overweight (Gordon-Larsen, Adair & Popkin, 2002; Gordon-Larsen, McMurray & Popkin, 1999). Research has highlighted differences in activity levels and activity

preferences between ethnic groups. In the UK, children from Black and South Asian backgrounds have been found to have lower levels of activity compared to White British children (Falconer et al., 2014). South Asian children have also been shown to have lower activity levels compared to White European and Black African-Caribbean children, Although Black African-Caribbean children are more active than White children (Owen et al., 2009a). Again, Duncan, Birch, Al-Nakeeb, & Nevill (2012) reported that South Asian children spent less time in physical activity compared to White European children, however, girls achieved greater percentage in gender-specific cut-off point for health compared to boys. White children had the highest levels of activity compared to South Asian and Black children (Woodfield, Duncan, Al-Nakeeb, Nevill, & Jenkins, 2002).

Among 4-11 year olds children in the USA, Black Africans had the lowest level of activity and the greatest amount of sedentary time compared to non-Hispanic Whites and Hispanic children, especially girls (Anderson, Economos & Must, 2008). Moderate-to-vigorous physical activity (MVPA) among 6th grade girls was higher among White compared to Hispanic and Black girls, although, perceived transportation barriers are positively associated with MVPA and BMI in Hispanic girls (Kelly et al., 2010). Black girls had a greater amount of sedentary behaviour and were less likely to be active. Black girls reported 30 minute fewer in MVPA than White girls and this linked to their greater BMI level (Felton et al., 2002).

2.3.4 Hereditary and genetic influences

Obesity is known to have strong hereditary and genetic elements. Parental weight status is a significant predictor of child weight status, with maternal BMI having a greater influence than paternal BMI (Gibson et al., 2007). In one study, non-obese 1 and 2 year olds with obese parents were shown to have a 28% chance of becoming obese as adults, compared to just 10% for those without an obese parent. Among obese 3 to 5 year old children, the chance of developing adult obesity increased from 24% if neither parent was obese to 62% if at least one parent was obese (Whitaker, Wright, Pepe, Seidel & Dietz, 1997). Further research has tracked the influence of maternal obesity and weight gain into adolescence and even adulthood (Salsberry & Reagan, 2007).

Associations between parental and child weight can be affected by both genetic and environmental influences, which in fact interact with each other (Patrick & Nicklaus, 2005; Wardle, 2007). If parents are living in a household making poor food choices, their child will likely eat a similar diet. However, there is also a genetic component to weight. Genetic influence has been attributed to 50 – 90% of the variation in weight (Maes, Neale & Eaves, 1997). Adopted children have BMIs that are closer to their biological parents than adoptive parents, suggesting a stronger influence of genetics than environment (Stunkard et al., 1986).

It is not only weight itself that is heritable, but also genes responsible for satiety responsiveness (Tholin, Rasmussen, Tynelius & Karlsson, 2005), energy intake (de Castro, 1993) and eating in the absence of hunger (Kral & Faith, 2009). Further genes have been linked to food preferences (Falciglia & Norton, 1994) and taste sensitivity (Mennella, Pepino & Reed, 2005). Fussy eating is also considered to have a genetic basis (Dovey, Staples, Gibson & Halford, 2008; Wardle & Cooke, 2008).

As genetics research has developed, more and more insight is being gained into specific genes that might be responsible for obesity. Although it is often combinations of genes that have the greatest influence (Wisniewski & Chernausek, 2009), one of the most commonly identified genes to have an impact upon obesity risk is the FTO gene (Bouchard, 2009). Individuals who have this gene are more likely to be overweight and have a higher BMI than those who do not (Scuteri et al., 2007). Some research has suggested that this association becomes stronger as the individual ages (Haworth et al., 2008). The difference can be on average 3 – 4 kg between those who have the gene and those who do not (Wisniewski & Chernausek, 2009). Those who possess the FTO gene are also more likely to show uncontrolled eating patterns, eating too much in the absence of hunger and craving for food (less control) (Tanofsky-Kraff et al., 2009; Wardle et al., 2008). Satiety responsiveness – or the ability to stop eating when full – is also higher in those who do not have the gene, leading to a lower overall energy intake (Kaakinen et al., 2010).

Emerging research is showing that variations may be present in genes that affect obesity between ethnic groups. Research has suggested that the FTO gene is less likely to be present in European Americans compared to Hispanics and American

Indians, with the lowest likelihood in Black Americans (Hassanein et al., 2010). For example, a genome-wide association study for BMI was conducted amongst 2,684 people in Indian Asian and European groups, with a further testing in 12,000 individuals. Individuals from Indian Asian backgrounds [36%] were more likely to have alleles present that are associated with increased waist circumference (rs12970134 near MC4R) compared to White Europeans [27%] (Chambers et al., 2008). In another study, South Asian adults were more likely to have a variation of the FTO gene compared to White British adults (Rees et al., 2011). Notably, in one study comparing Hispanic and Black African Americans (both who have an increased risk of overweight), a variant of the FTO gene was more likely to be found amongst Hispanic compared to Black African Americans, with a link to increased overall fat mass. This supports critique that BMI alone may not indicate increased fat mass amongst Black populations (Wing et al., 2009). Similarly, a further study found that having a copy of the FTO gene appeared to have an even greater impact upon weight in South Asian children compared to White European children (Shinozaki & Okuda, 2012), although further research is needed.

2.3.5 Low birth weight

Increasing research is identifying the importance of the prenatal period upon different aspects of health. Weight is a key outcome, with maternal health and behaviours during pregnancy attributed to both restricted and accelerated growth in the womb, and thus low or high birth weight, which in turn can affect later growth and health (Anzman, Rollins, & Birch, 2010). The thrifty phenotype hypothesis suggests that undernutrition in the early life of foetuses and infants creates susceptibility changes due to reduced lean body mass and insulin resistance and poor development of pancreatic B-cell function that causes diabetes later in life. Children who are exposed to famine during pregnancy and were then well-nourished in childhood may exhibit symptoms of metabolic syndrome as adults (Hales & Barker, 2001).

Birth weight is an important indicator of later overweight and related illnesses. Both low and high birthweight can be predictive of overweight through different pathways. Babies who are born a low birth weight often start to catch up on weight too quickly outside of the womb, known as ‘rapid catch up growth’. For example,

Taveras et al. (2011) showed that exceeding a greater ≥ 2 weight-for-length percentile gain in the first 6 months is linked with a significant obesity risk at 5 years of age. Tzoulaki et al. (2010) also found positive relations between early post-natal weight growth over the 2 years of life and the BMI and waist circumference at the age of 31 years. In addition, Toschke et al. (2004) studied weight gain amongst 4235 German infants. Weight gain during the first two years was a significant predictor for overweight at school entry age compared to other anthropometric markers and intervals. This rapid growth, and subsequent increased risk of obesity has been linked to later overweight and heart disease (Baird et al., 2005) and babies with rapid catch up growth are more likely to have insulin resistance, diabetes and high blood pressure in adulthood (Tzoulaki et al., 2008).

A number of differences in infant growth and weight have been identified between ethnic groups. Babies of South Asian backgrounds have a lower mean birth weight than White British babies, placing them at risk of rapid catch up growth (Chowdhury, Ammari, Burden, & Gregory, 2000). Findings from the nationally representative UK Millennium Cohort Study reported differences between ethnic groups in terms of birthweight, finding that babies from Black African Caribbean, Bangladeshi and Pakistani infants had a higher risk of underweight compared to White British infants. This is partly explained through genetic and inheritance factors (Indian and Bangladeshi mothers themselves had shorter stature), combined with increased rates of socioeconomic deprivation (Kelly et al., 2009).

Further research confirms this, finding mothers from South Asian backgrounds are more likely to have a low birth weight baby in the UK, even when they are a second generation immigrant. However, compared to South Asian infants born in India, those in the UK weigh significantly more at birth, highlighting the importance of both genetics and environmental factors (Dhawan, 1995). Second generation immigrant infants are slightly heavier than first generation immigrants, suggesting an impact of improved diet and healthcare (Leon & Moser, 2012).

Limited research in the USA has identified that infants from minority ethnic backgrounds may subsequently be at risk of increased catch up growth. One study in the USA found that Black American babies gain weight faster in the early months of

life compared to White American babies (Tate, Dezateux & Cole, 2006). One study comparing South Asian and European infants in the UK has also shown that South Asian babies gain more weight from birth to 3 months, specifically boys, which is associated with greater systolic blood pressure at 12 months of age (Bansal et al., 2008).

Maternal diet during pregnancy can also affect low infant birth weight. Iron is a particularly important element as low levels have been associated with poor growth and failure to thrive. In a retrospective analysis of 153,602 pregnant women, failure of haemoglobin concentration to fall below 105 g/l was associated with up to sevenfold increase in the incidence of low birthweight and preterm birth (Steer, Alam, Wadsworth & Welch, 1995). Low iron intake during pregnancy is common, with 22% not meeting even the lower Reference Nutrient Intake. Mothers from South Asian, Black African and Caribbean groups have significantly lower intakes compared to White mothers (Rees et al., 2005).

Vitamin D intake has also been associated with low birth weight. Research shows that every additional microgram of daily vitamin D during pregnancy correlates with an increased birth weight of 11 g (Mannion, Gray-Donald & Koski, 2006). Individuals with darker skin are more likely to be vitamin D deficient and a study with Indian women with low-birth and normal-weight infants found that Vitamin D deficiency is prevalent, in general, among these women (Agarwal et al., 2012).

In the US, minority ethnic groups of Black and Hispanic women had a lower total intake of Vitamin D during their pregnancy per day ($<5 \mu\text{g}$ or 200 IU), and this factor was associated significantly with the low birth weight of their infants (Scholl & Chen, 2009). In the UK, a study among South Asians and White Caucasians reported that low vitamin D serum (25 (OH) D) levels $<25 \text{ nmol/l}$ were more prevalent in South Asian women in both winter and autumn (81% and 79.2% respectively). Vitamin D deficiency was related to adverse risk effects during pregnancy. The reasons behind vitamin D differences were linked to sun exposure behaviour and clothing style (Darling et al., 2012).

2.3.6 High birth weight

High birth weight is also associated with an increased risk of overweight. Maternal diet, and the energy that reaches the infant, can ‘programme’ the infant to expect and take in excess calories, leading to continued excess intake and thus overweight after they are born. The infant receives glucose, amino acids and fatty acids through the placenta. If maternal levels of these elements are too high, the baby can receive too much. Babies whose mother has a large intake of these nutrients are therefore more likely to be overweight at age ten (Brion et al., 2010).

Maternal overweight is also related to increased risk of overweight for both genetic and dietary intake reasons. Children born to obese mothers are twice as likely to be obese at the age of two (Whitaker, 2004). Nutrient intake matters as research has shown that if a mother reduces her weight and calorie intake during pregnancy, her baby is less likely to be overweight than those who do not lose weight (Smith et al., 2009). Maternal pre-pregnancy BMI is associated with risk of increased weight, but BMI during pregnancy is a stronger predictor, due to levels of glucose and insulin being passed to her baby (Catalano & Ehrenberg, 2006).

Maternal pregnancy weight differs between ethnic groups. Black mothers compared to Hispanic, White and Asian mothers are more likely to be classified as overweight before pregnancy, with an increasing weight gain during pregnancy (49% weighing between 200-299 lbs and 63.9% weighing over 300 lbs) (Rosenberg, Garbers, Chavkin & Chiasson, 2003). Black women are also more likely to retain weight after pregnancy, known as postpartum weight retention (PPWR) in comparison to Hispanics women and White women (Headen, Davis, Mujahid & Abrams, 2012). However, consideration must be given to earlier points that classification of overweight amongst Black populations may not be indicative of obesity related health issues.

Mothers who have, or develop, diabetes (Gestational Diabetes Mellitus, GDM) during pregnancy are more likely to have babies who are overweight at birth and have increased BMI during childhood (Landon et al., 2009; Nohr et al., 2008; Silverman, Rizzo, Cho & Metzger, 1998). High levels of glucose and insulin

circulating to the infant cause them to gain more weight in the womb. Therefore, better glycaemic control in later pregnancy may have a greater impact on infant weight and growth and therefore prevent the tendency of childhood obesity. Research in the USA has shown that Hispanic mothers are more likely to develop gestational diabetes compared to White women (Chu et al., 2009), in part due to an increased likelihood of Hispanic mothers being overweight at the start of pregnancy (Savitz, Janevic, Engel, Kaufman & Herring, 2008).

GDM is associated with gestational weight gain primarily in the first trimester. Research in the USA has shown that rate of weight gain is increased amongst Hispanic and Black American mothers compared to White mothers (Hedderson, Gunderson & Ferrara, 2010). Further research supports this showing greater intake amongst mothers being treated for GDM who are from a Hispanic or Black background compared to White mothers (Chakkalakal, Gebretsadik, Jagasia, Shintani & Elasy, 2015). Asian mothers in the USA (e.g. Chinese, Filipino) are at a significantly lower risk of excessive weight gain if they have GDM compared to Hispanic, Black and White mothers, suggesting a genetic influence (Gunderson, Abrams & Selvin, 2000).

However, as noted above, overweight and obesity is far more complex than diet and activity, or predisposition to weight through genetics or prenatal factors. Understanding these influences – and how they differ between ethnic groups – is an important step in understanding why differences in childhood obesity may differ between ethnic groups. As the Ecological systems theory shows, children have multiple layers of influence on their weight. These influences do include the individual child level (e.g. dietary intake, activity and genetic susceptibility), but also at the microsystem level (e.g. parenting styles and family characteristics such as child feeding practices, television viewing, and food available in the home), and the exosystem level (e.g. community, demographic and societal characteristics such as socioeconomic status, schools and ethnicity). Additionally, those at the microsystem are affected in their own choices and engagements with their children by those influences at the macrosystem level. These influences are established predictors of childhood overweight, but how might they differ between ethnic groups?

2.4 Microsystem factors

At the microsystem, the child is influenced by those around them including parents, siblings, friends and others such as teachers. A wide body of literature has examined the impact of external influences on child weight and eating behaviour, particularly based around the family environment (Rosenkranz & Dziewaltowski, 2008).

2.4.1 Family size

There is some evidence to suggest that children from larger families, with greater numbers of siblings are more likely to be overweight (Castro & Brewer, 1992). Much of the research examining this is now potentially outdated, but still of interest. For example, families with greater numbers of children are more likely to have high levels of stress, particularly maternal distress, although this is exacerbated by poverty (Conger, McCarty, Yang, Lahey & Kropp, 1984). Mothers with higher numbers of children can pay less individual attention to each child (Burgess, Anderson, Schellenbach & Conger, 1981). Lower maternal engagement is associated with child overweight (Whitaker, Phillips, Orzol, & Burdette, 2007). Larger families are also less likely to have positive mealtime engagements together, instead being more likely to eat in front of the television (Golan, 2006). All these factors can lead to a greater intake of calories amongst those living in larger households due to more food availability and less individualised attention (Sobal, 2001).

In the UK, South Asian families are more likely to be larger, specifically amongst Indian and Pakistani groups (Penn & Lambert, 2002). Recent data from the Office for National Statistics in the UK reported that household types differ in terms of ethnic groups. Asian ethnic groups are the most likely to be part of large families with more dependent children, the percentage varies from 43% of Bangladeshi, 39% of Pakistani and then Indian with 30%. The next following ethnic groups with more dependent children in the family are Black African with 21% compared to 14% of White British (Office for National Statistics, 2011). Similarly, in the USA, family size differs according to ethnic group; almost 50% of Hispanics have a larger family size with more than three children in the household. Black people have the second largest family sizes with 40% having more than three children, followed by 33% for White Americans, and the lowest percentage among Asian families at 27% (Livingston, 2015). Larger family sizes may therefore increase risk of overweight.

2.4.2 Maternal influences

The influence of mothers – their knowledge, own preferences and beliefs - makes up the bulk of this literature (Ventura & Birch, 2008). Although paternal influences are important, the majority of work in this area is conducted with mothers as they typically report greater responsibility for their child's diet (Wardle, Carnell & Cooke, 2005). Even when paternal experience is examined (e.g. Haycraft & Blissett, 2008), maternal feeding style is usually stronger and more evident, particularly when it comes to factors such as perceiving responsibility and monitoring (Blissett, Meyer & Haycraft, 2006; Francis, Hofer & Birch, 2001).

Many of these influences have not been directly explored in combination in one study in relation to maternal factor, child weight and ethnicity. For example, research has been conducted showing that maternal education is associated with child weight, with separate research showing maternal education differs between ethnic groups. Therefore piecing the evidence together we can see a pattern and hypothesis as to the links, but further research should specifically examine these patterns in one study.

2.4.3 Maternal knowledge and education

Mothers with higher levels of education are less likely to have a child who is overweight (Marshall et al., 2007), in part because they are more likely to offer their children a more balanced diet and wider variety of nutrients (Vereecken, Keukelier & Maes, 2004). Maternal education is also linked to a lower intake of soft drinks (Vereecken, Keukelier & Maes, 2004). Knowledge of nutrition is also higher amongst those mothers with a higher education, which in turn is associated with increased child intake of fibre and vegetables (Gibson, Wardle & Watts, 1998). Mothers with a higher level of education are more likely to recognise their child as overweight (McCurdy, Gorman, Kisler & Metallinos-Katsaras, 2014; Warschburger & Kröller, 2009) and use more responsive child feeding interactions (Saxton, Carnell, Cornelia, Jaarsveld & Wadde, 2009). Limited research has also shown that paternal education also matters. Children with fathers with a higher level of education have a more nutrient varied diet and increased levels of physical activity (Farajian et al., 2013; Shrewsbury & Wardle, 2008; Van Jaarsveld, Miles & Wardle, 2007).

Compared to White Caucasian mothers, Pakistani and Bangladeshi mothers have on average, lower levels of academic qualifications than all other groups, whereas Indian and Black mothers tend to have higher qualifications. The educational levels also differ among those born in the UK or those who have migrated to the UK in the first and second generations. Of Black mothers who are born in the UK, 73% have a higher degree vs 34% first-generation Black mothers. A higher degree refers to national vocational qualification by using a variable that gives equivalence levels 4 and 5 (e.g. diploma of higher education or further education, bachelor's degree, postgraduate degree).

Meanwhile, the lowest level of mothers with no degree is seen in the group of White British mothers (Jayaweera, Hockley, Redshaw & Quigley, 2007). Maternal level of education also differs between ethnic groups in the USA. In 2008, the highest level of mothers with at least a bachelor degree is seen among Asian mothers at 51% compared to White American mothers at 36%. The percentage of Black mothers who have a bachelor degree was 17% compared to Hispanic mothers at 11% (Aud, Fox & KewalRamani, 2010).

2.4.4 Maternal food preferences

Maternal own food preferences can affect children's preferences and nutrient intake, in part because mothers may offer children foods that they themselves like to cook and prepare (Francis & Birch, 2005). Children also model the eating habits of their mother, and if the mother eats a high proportion of fruit and vegetables her child is more likely to as well, and vice versa. Fat and 'junk food' consumption has also been shown to be similar (Cooke et al., 2004; Galloway, Fiorito, Lee & Birch, 2005).

In the USA, energy intake is higher among Hispanic mothers compared to Black and White American mothers. Hispanic mothers consumed more of all vitamins and calcium, with more vegetables and fruits and more juice, milk and energy in general compared to White and Black mothers. However, compared to White and Hispanic mothers, Black African mothers consumed more meat (Hoerr, Tsuei, Liu, Franklin & Nicklas, 2008). Dietary intake of food was lower in calories from fat, added sugars, sodium and soft drinks among Hispanic mothers, although, these mothers consumed more vitamin A, calcium, whole grains, fruits and total dairy compared to Black

African Americans. Both Africans and Hispanics did not meet the national recommendations for calories from saturated fat, whole grains, vegetables and fibre (Kong et al., 2013).

In the UK, compared to the White British women, Black and South Asian women consumed less vitamin A, riboflavin and folate in their diet. The percentage of calcium intake was 42% among Black women and 36% of South Asian women below the Reference Nutrition Intake (RNI) compared to White British women at 8% (Nelson, Erens & Bates, 2007). In a study conducted among Italian and South Asian women who were the first immigrants to the UK, compared to Italians, South Asian women had a higher consumption of fat and higher amount of sugary foods including crisps, desserts and fizzy beverages, with a low intake of fruits and vegetables, dairy foods and meat products (Anderson et al., 2005).

2.4.5 Maternal activity preferences

Maternal own activity levels can affect the activity levels of her child, both through attitudes towards the importance of activity, and through modelling healthy participation (Robinson, 2011). This can include aspects such as being prepared to take them to activities (Davison, Cutting & Birch, 2003). Mothers who have low activity levels themselves are more likely to have children with low activity levels (Massion et al., 2016; Raudsepp & Viira, 2000). Mothers of obese children are more likely to have low levels of activity compared to mothers of healthy weight children, are more likely to be overweight themselves and expend more time on watching TV and on computers (Wardle, Guthrie, Sanderson, Birch & Plomin, 2001).

Research exploring differences in maternal levels of activity between ethnic groups in the UK are limited. However, in the US, differences in physical activity have been identified between ethnic groups. For instance, Asian, Black, American Indian and Latino Hispanic mothers are less likely to engage in physical activity than non-Hispanic White mothers are (Eyler et al., 2002). Inactivity level is also found to be greater in African American and American Indian women. Family responsibilities and household duties are often the main reason given for lower levels (King et al., 2000). In the UK, in a systematic review of South Asian women's physical activity compared with that of White women, South Asian women were found to have lower

physical activity levels, and they did not perform the recommended level of physical activity for health benefits (Babakus & Thompson, 2012).

2.4.6 Maternal perceptions and preferences for child weight

Perceptions of weight are important as they can prevent parents from realizing there is a weight issue, or may lead to parents encouraging their child to eat more food to meet a desired weight (Scaglioni, Arrizza, Vacchi & Tedeschi, 2011). Mothers with a preference for a larger child are more likely to have a child who is overweight (Rosas et al., 2010), with mothers often not recognising that their child is overweight (Maynard, Galuska, Blanck & Serdula, 2003).

Perceptions and preferences for child weight have been shown to differ between cultures. For some, a child who is viewed as thin (although often a healthy weight) may be a reflection of poor health, malnutrition and therefore poor mothering. Larger children are therefore seen as healthier. Others may view a child who has a smaller appetite as anxiety provoking (Dixon, Peña & Taveras, 2012).

Preferences can be culturally driven. For example, one study that used focus groups and individual interviews with 51 Spanish-speaking, low-income mothers living in the US to explore perceptions of weight and child-feeding beliefs and practices found a high desire for a 'chubby child'. Mothers were pressured to rear children at higher weights because this was viewed as desirable within Latino culture (Lindsay, Sussner, Greaney & Peterson, 2011).

Similar patterns have been reported among mothers from Black African-American backgrounds. One study used a focus-group approach with 13 low-income African-American mothers to examine their perceptions concerning what they view as an overweight child. They found that overweight was viewed as a reflection of good health and prosperity, particularly if income was low within the family. A larger child was viewed as an indicator of success and was encouraged by others (Jain et al., 2001).

This theme of cultural pressure intertwined with deprivation has been identified in several other studies among African-American and Hispanic mothers. An overweight

child is viewed as reassurance, providing an outward sign of health and success, or as a means of hiding adversity (Rosas et al., 2010; Skelton, Busey & Havens, 2006). These preferences and norms may affect mothers' ability to realise when their children are overweight. In one study of 117 African-American children and their parents, 90% of African-American boys and 80% of girls aged 5 to 10 were classified as overweight or obese, but only 30% of their parents classified their children as overweight (Young- Hyman et al., 2003).

Research in the US has shown that parents from Latino, African-American and Mexican backgrounds are less likely to recognise that their children are overweight compared with those from White American backgrounds, and they are more likely to prefer overweight children (Eckstein et al., 2006; Killion, Hughes, Wendt, Pease & Nicklas, 2006; Pasch et al., 2016). In one study of 233 Black African and Hispanic children and their parents, only 36% of parents with overweight children recognised that their children were overweight (Eckstein et al., 2006).

In another study involving 192 African-American and Hispanic mothers and their children, most underestimated their children's body sizes. Two-thirds of mothers with overweight children were satisfied with their children's body sizes or wanted their children to be heavier, with half of mothers with children above the 95th percentile for BMI happy with their sizes (Killion et al., 2006).

Finally, another study with 173 Mexican fathers and 213 mothers, and their children, aged 8 to 10, looked at weight perceptions. Although 50% of children were overweight or obese, only 10% of fathers and 11% of mothers perceived their children as overweight. Parents who preferred a heavier child body size underestimated their children's weight compared with parents who preferred leaner children (Pasch et al., 2016).

Research into ethnic differences in perceptions and preferences for child weight in the UK is sparse. One study used a questionnaire with 808 parents of children aged 4 to 16 from South Asian, Black African, Somali, Chinese, White British and Yemeni backgrounds. Parents from Somali backgrounds were more likely to perceive a larger

child size to be healthier compared with other groups (Trigwell, Watson, Murphy, Stratton & Cable, 2013).

2.4.7 Maternal child feeding style

As well as what foods parents give their children, the way in which they interact with them around food and food choices is important. Parents who feed their children responsively e.g. offering healthy choices, but allow them control in deciding when they are hungry and full, not preventing them from eating or pressurising them to eat more, have children who go on to have the healthiest weight and eating behaviour (Ventura & Birch, 2008). The majority of babies are naturally able to control their intake of food according to energy needs (Fomon, Filmer, Thomas, Anderson & Nelson, 1975), but experiences over time, often condition them to respond to external cues of when to start and stop eating, such as being told to finish all the food on their plate (Rolls, Row & Meengs, 2006).

Allowing children to respond to their own internal cues of appetite is important in helping children be satiety responsive e.g. eat when they are hungry rather than when someone else says they should, and therefore maintain a healthy weight. Likewise, not pressurising children to like or disliked foods is important in preventing them from becoming food reluctance. However, many parents worry that they must be in control of deciding what, when and how much their children eat and may pressure them to eat or restrict certain foods, often with negative consequences (Benton, 2004).

Although some control over what a child eats is important, this control should take the form of offering healthy choices and allowing a child to determine when they are hungry and full, rather than restricting or pressurising them to eat more (Ogden, Reynolds & Smith, 2006). Offering access to healthy foods and limiting, but not removing entirely access to snack foods is associated long term with healthier weight patterns (Brown & Ogden, 2004). Conversely, a number of more controlling child feeding practices that are associated with child weight and eating behaviour have been identified and can be measured through validated questionnaires. For example, the Child Feeding Questionnaire [CFQ] (Birch, Fisher, Grimm-Thomas, Markey, Sawyer & Johnson, 2001) measures beliefs and practices such as maternal perceived

responsibility, concerns about child weight, restriction, pressure to eat, and monitoring. The Parental Feeding Style Questionnaire [PFSQ] (Wardle, Sanderson, Guthrie, Rapoport & Plomin, 2002) also measures four parents feeding domains - control over feeding, emotional feeding, instrumental feeding and encouragement to eat.

Restricting a child's intake of food – particularly those that are palatable – is associated with an increased likelihood of children eating in the absence of hunger (Birch, Fisher & Davison, 2003; Faith, Scanlon, Birch, Francis & Sherry, 2004; Rollins, Loken, Savage & Birch, 2013), an increased intake when given free access to restricted foods (Birch & Fisher, 2000) and a decrease in ability to be satiety responsive (Jansen, Mulken, Emond & Jansen, 2008; Rodgers et al., 2013a). Children whose parents restrict certain foods are more likely to increase their preference for those foods, as the forbidden becomes increasingly desired (Liem, Mars & De Graaf, 2004). In experimental settings, if children rate two foods as similarly preferred, preference for a food that is then restricted increases relative to the freely accessed food (Birch, 1998). Furthermore, children who know their parents restrict their access to foods, further increases how much they will eat of them when given free access (Fisher & Birch, 1999).

Restriction is often driven by concern that a child is, or will become overweight. However, restriction actually increases the risk of the child becoming overweight because they take in an excess of calories when they are available (Farrow & Blissett, 2006; Fisher & Birch, 1999; Ogden, Reynolds & Smith, 2006; Stang & Loth, 2011; Webber, Cooke, Hill & Wardle, 2010), although not all studies have found a link between maternal restriction and weight (Haycraft & Blissett, 2008; Wisniewski & Chernausek, 2009).

The causality between restriction and child weight has been questioned. Although mothers can be more likely to restrict their child's intake of food if they are overweight (Musher-Eizenman, Holub, Hauser & Young, 2007), restriction can in turn increase the likelihood of that child becoming further overweight because it exacerbates behaviours such as eating in the absence of hunger (Clark, Goyder, Bissell, Blank & Peters, 2007). Research that has attempted to assess this over time

has shown that maternal restriction at age 5 predicts child weight at age 7, independently of weight at age 5 (Faith et al., 2004).

Another common behaviour is pressurising a child to eat, either in terms of amount or for certain foods. This strategy is often employed because parents think it will increase the variety or amount of their diet, but pressurising a child to eat can often have the opposite effect. Children who are pressured to eat foods they do not like actually end up further disliking that food and eat even less (Montgomery, Jackson, Kelly & Reilly, 2006).

Pressure to eat is linked to fussy eating (Farrow, Galloway & Fraser, 2008) and a lower intake of fruit and vegetables (Fisher, Mitchell, Smiciklas-Wright & Birch, 2002; Galloway, Lee & Birch, 2003). Although pressure to eat might arise from a picky child, in experimental settings, if children were pressured to eat a neutrally rated soup, their ratings and consumption of the soup decreased (Galloway, Fiorito, Francis & Birch, 2006). Pressure to eat is therefore associated with an even lower intake of nutrient dense foods (Hurley, Black, Papas & Caufield, 2008).

Pressure to eat can be linked to child risk of underweight (Brann & Skinner, 2005; Kroller & Warschburger, 2008). This relationship can again be bidirectional. Mothers who worry about their child's weight are more likely to pressurise them to eat (Brann & Skinner, 2005; Francis, Hofer & Birch, 2001; Galloway, Lee & Birch, 2003). However, in their longitudinal work, Faith et al. (2004) found that pressure to eat at age five negatively predicted child weight at age seven, independently of initial weight.

Instrumental feeding is a style that uses food as a reward so that children can obtain a desired outcome in return for good behaviour. Instrumental feeding may involve reinforcing their children towards a positive association of palatable foods that will lead to strengthen their preference to gain high-calorie foods as a reward (Benton, 2004). Maternal use of emotional feeding styles increases the risk of children engaging in emotional eating (Ogden, Cordey, Culter & Thomas, 2013; Rodgers et al., 2013a). Emotional feeding can lead to children associating easing their emotions with food, and can in some cases lead to an increase risk of disordered eating as

adolescents and adults (Braden et al., 2014). It has also been associated with an increased likelihood of eating in the absence of hunger. Mothers who offer food to children to regulate their emotional feeding found that those children consumed more cookies in a lab paradigm compared to the children whose mothers did not use emotional feeding practices (Blissett, Haycraft & Farrow, 2010).

In the US, a wide body of extant literature has considered whether differences can be found in maternal feeding style between ethnic groups. Maternal use of both pressure to eat (Sherry et al., 2004; Wehrly, Bonilla, Perez & Liew, 2014) and restriction (Cardel et al., 2012) are higher among Hispanic and African American parents compared with White parents. For example, Sherry et al. (2004) conducted 12 focus groups of mothers with children aged 2 to 5 from Hispanic, White and African-American backgrounds to explore maternal attitudes, concerns and child-feeding practices. They found that Hispanic mothers demonstrated the highest levels of pressure to eat, persuading their children to keep eating even when they said they were full, compared with White and African-American mothers.

In another study, Wehrly et al. (2014) examined child-feeding style differences among White, Asian and African-American mothers in the US. They found that compared with White non-Hispanic parents, Asian and Black parents were more likely to use pressurising feeding styles. Likewise, in a similar study of 267 mothers from Hispanic-American, African-American and White European American backgrounds, Hispanic-American and African-American mothers were more likely to pressure their children to eat and use restriction feeding, compared with White European American mothers (Cardel et al., 2012). This may be linked to cultural values among these ethnic minority parents. Similar findings were reported from a range of other studies. Mothers from African-American backgrounds are more likely to use higher levels of restriction and pressure to eat, compared with White American mothers (Sacco, Bentley, Carby-Shields, Borja & Goldman, 2007; Spruijt-Metz, Cohen, Birch & Goran, 2006).

In terms of instrumental feeding, emotional and indulgent feeding styles are also more likely to be used by Black African and Hispanic mothers compared with White American mothers (Hughes, Power, Fisher, Mueller & Nicklas 2005; Hurley, Cross

& Hughes, 2011). In one cross-sectional study conducted to examine differences in parental feeding practices by ethnicity among parents of children aged 1 to 5, Hispanic and Black mothers were more likely to report using food to calm or shape a child's behaviour compared with White mothers (Evans et al., 2011). Likewise, a systematic review by Hurley, Cross & Hughes (2011) highlighted the relationship between parents' indulgence and children's weight. Six studies reported a positive association between indulgent feeding and children's BMI or overweight. Within this, two studies stated that Hispanic and African American parents were more likely to use indulgent feeding behaviour compared with White parents.

Research examining feeding styles among Chinese parents is relatively scant. One study examined ethnic-group differences for parents controlling feeding practices and body composition of children aged 4 to 6. It found that mothers from Chinese backgrounds in the US were more likely to use high levels of restriction compared with other groups. These mothers reported trying to prevent their children from adopting perceived unhealthy Western diets, or 'Americanised' eating styles, viewing it as a moral duty to prevent them from becoming overweight (Wehrly, Bonilla, Perez & Liew, 2014).

In another comparative study between Chinese American and White American mothers of children aged 2 to 12 to assess child feeding practices related to child weight status, Chinese-American mothers were found to use higher levels of restriction and monitoring compared with White mothers (Huang et al., 2012). Similarly, in another study, maternal child parenting attitudes were assessed between three cultures: Chinese mothers living in Taiwan, and Chinese American and White mothers. Regardless of location, Chinese mothers adhered to restrictive feeding styles for children more often than White mothers (Chiu, 1987).

However, extant research outside the United States exploring differences in maternal child feeding between ethnic groups remains sparse. A comparative research study in Europe conducted with a sample of 171 families from three different ethnic and cultural backgrounds (British Black African-Caribbean, White British and White German) found that parents from Black African-Caribbean backgrounds are more likely to use high levels of restriction compared with White British and White

German parents (Blissett & Bennett, 2013). Concerning their methods, parents completed three questionnaires (CFPQ, CEBQ, and DEBQ) to assess feeding practices and eating behaviours, while experimenters measured and weighed their children. However, the data lack a detailed representation of what children eat (types of food) or what their parents offer them. No measures of cultural differences in parental perceptions of children's eating behaviour were provided either. Most participants were middle class, and results may vary if extrapolated to different classes, such as lower socioeconomic groups. The sample size was relatively small, with a wide age range in the children used, which may weaken developmental differences between cultural groups.

Likewise, a recent cross-sectional study conducted in the UK among 372 mothers of preschool children found that South Asian and Black African-Caribbean parents used higher levels of pressure to eat, compared with White British parents, alongside higher levels of emotional feeding (South Asian) and instrumental feeding (Black African-Caribbean) (Gu, Warkentin, Mais & Carnell, 2017). Parents, mostly mothers, completed two questionnaires (PFSQ and CFQ) that assessed parental beliefs, attitudes and practices regarding child feeding, while their children were weighed and measured. However, acculturation level was not stated as being used to measure the influence of culture on the parents' behaviour. Self-reported measures of practices were another limitation, rather than participants being directly observed and measured. Fathers were under-represented compared with mothers as well.

Another longitudinal cohort study conducted with 987 parents found similar patterns, finding that Pakistani mothers in Bradford, England, in the UK were more likely to use pressure-feeding styles with their children than White Caucasian mothers (Fairley et al., 2015). This study explored how a number of known but modifiable risk factors were associated with child weight at age three, and how these factors differed between ethnic groups. As part of this, mothers completed the caregivers' feeding-styles questionnaire (CFSQ) at 24 months, which examines authoritative, authoritarian, indulgent and uninvolved feeding practices. Mothers from Pakistani backgrounds were more likely to use higher levels of authoritarian, pressurising feeding styles. The authors themselves noted the limitation because they explored the data using multiple statistical tests to examine how different variables were

associated with obesity risk; some of their significant findings arose through chance. Maternal feeding style was also just one variable collected in the study amongst many, rather than the study having a specific focus of differences in feeding style between ethnic groups.

In a case study (focus groups) conducted among 68 stakeholders from the UK's South Asian communities, grandparents can exert lots of power on food choices, and how food is brought together and shared. In short, the findings also found that an unhealthy food intake was associated with external cultural influences associated with social and religious practices and perceived lack of awareness of healthy lifestyles and children's preferences (Pallan, Parry & Adab, 2012). However, the focus groups involved a small numbers of participants, which may limit the discussion. Most of the views were expressed from the female perspective due to low male participation in the study. Two theoretical models were included: Davison & Birch's model (2001) and the 'Causal Web' model proposed by IOTF that represents the contextual influences on individual lifestyle choices by Kumanyika et al. (2002). However, a central finding was the importance of cultural context, which was not considered explicitly in the two models.

2.4.8 Maternal own eating behaviour

Humans eat for many reasons, many of which are not related to simple hunger (Ogden, 2011). Eating behaviour is typically measured along three broad aspects: how restrained an individual is e.g. dieting, restricting intake of food, how uncontrolled they are e.g. eating in response to smelling or seeing food, and finally whether they eat for emotional reasons e.g. eating in response to sadness, boredom, or happiness (Stunkard & Messick, 1985). Eating for reasons not associated with hunger or trying to restrict intake of food can understandably affect weight and therefore physical and emotional health (Wyert, Winters & Dubbert, 2006), but understanding the link between eating and weight, and its influences is not always straightforward.

In terms of restrained eating, individuals who are high in cognitive restraint are more likely to be overweight, applying restrained eating in relation to body dissatisfaction and wishing to lose weight (Johnson & Wardle, 2005). However, too much restraint

can lead to uncontrolled eating, which in turn can lead to more restraint, and the cycle continues (Woods, Racine & Klump, 2010). Emotional eating is also associated with increased risk of overweight due to an excess intake of calories (Snoek, Van Strien, Janssens & Engels, 2007). Eating in response to emotional reactions, can lead to eating in the absence of hunger, and thus overweight (Macht, 2008).

Maternal own perceptions of her weight and associated eating behaviour have also been linked to child weight and eating behaviour. Some studies suggest that mothers who are themselves overweight are more likely to worry about their daughters weight, even if their daughter is not overweight (Francis, Hofer & Birch, 2001; Johannsen, Johannsen & Specker, 2006). However, others discover that maternal obesity is linked to lower control, allowing the child to eat outside meal times and to eat lots of snack foods (Fisher & Birch, 1999; Orrell-Valente et al. 2007).

Maternal weight and child feeding style are also related. Mothers with a higher BMI are more likely to report restricting their child's intake of food (Haycraft & Blissett, 2008) although not all research is conclusive (Wardle et al., 2002). This might also affect children's eating. Children of overweight mothers are more likely to eat in the absence of hunger (Fisher, Rolls & Birch, 2003) and are more likely to follow prompts to eat (Lumeng & Burke, 2006), suggesting a breakdown in self-regulation.

Maternal eating behaviour is also associated with her feeding perceptions and interactions with her child and as a result, similarities can be seen between mother and child eating behaviour (Jahnke & Warchsburger, 2008). Mothers who are high in restraint are more likely to restrict their child's intake of food (Francis, Hofer & Birch, 2001; Rodgers et al., 2013a; Tiggemann & Lowes, 2002), often out of a belief that they will protect their child from becoming overweight like themselves (Benton, 2004). Higher levels of maternal restriction are also seen in those with lower body satisfaction (Duke, Bryson, Hammer & Agras, 2004) or have symptoms of eating disorders such as bulimia (Farrow & Blissett, 2009).

Unfortunately, this can often have the opposite effect. Although not all research is conclusive, mothers who use high levels of controlling feeding practices with their

child are more likely to have a child who is overweight, because restricting a food increases desire (Webber, Hill, Cooke, Carnell & Wardle, 2010). Children whose mother is high in restriction are therefore more likely to eat in the absence of hunger when given free access to restricted foods (Kral & Rauh, 2010), thus being at greater risk of overweight (Faith & Kerns, 2005). However, in some cases mothers high in restraint are more likely to have children, especially adolescents, who adopted restrained eating themselves (Neumark-Sztainer et al., 2010).

Mothers who are emotional eaters are more likely to use emotional feeding styles with their children, giving food in response to their child's emotions (Wardle et al., 2002). Mothers apply the same logic that they use to eat to their children e.g. trying to deal with sadness through eating palatable foods (Tan & Holub, 2015). Children of mothers who are high in emotional eaters are more likely to emotionally eat themselves (Lauzon-Guillain et al., 2009) and also are more likely to be overweight, due to an excess intake of energy (Hajna, Leblanc & Faight, 2014).

Factors such as body image (Tiggemann & Lynch, 2001) and cultural pressure (Braun, Park & Gorin, 2016) are well documented in affecting maternal restraint (and often uncontrolled eating). Stress is associated with both uncontrolled eating (particularly in those high in restraint) and emotional eating (Zellner et al., 2006). Variations have been associated with demographic background. A lower income (Reagan & Hersch, 2005) and financial difficulties have both been linked to emotional eating, most likely as an emotional coping mechanism (Koupil, Tooth, Heshmati & Mishra, 2016).

In addition, maternal weight is associated with maternal feeding style, although the evidence is in places contradictory. Firstly, mothers who are overweight have higher weight concerns about their daughters (Johannsen, Johannsen & Specker, 2006), independently of their daughters actual weight (Francis, Hofer & Birch, 2001). However, other studies have shown that obese mothers show less control over their child's diet (Orrell-Valente et al. 2007; Robinson, Kiernan, Matheson & Haydal, 2001) allowing an increased number of snack foods (Fisher & Birch, 1999). Moreover, associations have been found between higher maternal BMI and increased reported (but not observed) use of restriction and observed (but not reported) use of

pressure to eat (Haycraft & Blissett, 2008) and eating in the absence of hunger (Fisher, Rolls & Birch, 2003). Specifically, overweight mothers use a higher level of pressure to eat if their daughter is thinner and they are worried about future weight problems, suggesting their own weight concerns are affecting their use of control (Francis, Hofer & Birch, 2001). Conversely, other studies show no association between maternal BMI and maternal control. Wardle et al. (2002) for example found no difference in encouragement to eat between obese and normal weight mothers. However, children of obese mothers are more compliant with prompts to eat than children of non-obese mothers (Lumeng & Burke, 2006).

In terms of maternal body-image and own eating style, concerns appear to relate to maternal use of restriction. Mothers who themselves had higher personal weight and eating concerns were more likely to try and restrict their children's intake of food (Francis et al. 2001). Moreover, a parental history of eating disorders or general body dissatisfaction predicts restriction (Duke, Bryson, Hammer, & Agras, 2004). Eating styles also impact on feeding styles. Although associations are found between father and daughter dyads for eating style (Francis, Ventura, Marini, & Birch, 2007), the relationship between maternal and daughter eating styles are often stronger (Cutting, Fisher, Grimm-Thomas, & Birch, 1999; Jacobi, Agras & Hammer, 2001). Maternal restrained eating is associated with maternal restriction of access to snack foods (Fisher & Birch, 1999) and mothers high of restraint monitor daughters intake of food more (Tiggeman & Lowes, 2002).

Similarly, mothers who have symptoms of eating disorders are more likely to show a higher level of restriction. For example, mothers who scored highly on symptoms of drive for thinness and bulimia expressed higher levels of restriction (Farrow & Blissett, 2009). Conversely, high levels of maternal disinhibition has been associated with overweight in girls in one study (Cutting et al., 1999) and boys but not girls in another study (Whitaker, Deeks, Baughum & Specker, 2000). Overall it appears that parents who have dysfunctional attitudes towards their own body-image and eating style can pass these onto their children deliberately or inadvertently. A mother with poor body-image and a restrictive eating style may have high concerns that her child will become overweight. Through restricting

their intake of food she may believe she is doing the best for her child but in fact may possibly be placing the child at risk of overweight.

Although extant research has examined how differences in body image differ more broadly between ethnic groups, with South Asian (Cachelin, Rebeck, Chung & Pelayo, 2002) and African American (Wardle & Marsland, 1990) women typically having more positive body images than White American women, little research has examined variations in general, let alone maternal eating behaviour between ethnic groups, particularly in the UK.

However, some differences have been documented. In one US study of 801 women and 428 men, Asian women displayed less body dissatisfaction compared than Hispanic, Black and White women. No ethnic differences were found in body satisfaction among men. The study controlled for age, education and body weight (Cachelin, Rebeck, Chung & Pelayo, 2002).

Research has shown that although South Asian, Black African and Black Caribbean women living in the UK tend to have greater body confidence than White British women, over time, Western societies' slimness ideals influence women, leading to an increase in body dissatisfaction over time. For example, one study used focus groups of Black African and South Asian girls and women to examine factors that might affect food choices. They found that Black African women were starting to adopt Western dissatisfaction with their bodies, particularly the longer they lived in the UK (Lawrence et al., 2007).

Other studies find that women from cultures that praise larger silhouettes experience greater pressure to be a larger size, even if the dominant UK culture calls for being more slender. For example, one study used a qualitative focus group with 13 Somali women living in the UK to explore their perceptions and influences on body image and size. Overall, the findings indicated that Somali women felt influenced from Somali culture, which favours larger body sizes, and felt obligated to adhere to the traditional Somali diet (Gardner, Salah, Leavey & Porcellato, 2010).

2.4.9 Parenting style and child weight

A mother's general parenting style can affect her child's weight. Parenting styles are often characterised alongside two dimensions of warmth and control. An authoritative style is high in warmth and use an appropriate level of control, an authoritarian style is high in control and low in warmth, and a permissive style is high in warmth and low in control (Maccoby & Martin, 1983). The best outcomes tend to come from authoritative styles (Baumrind, 1993; Darling & Steinberg, 1993; Steinberg, Lamborn, Dornbusch & Darling, 1992). Parents who use more authoritative styles have children who have better educational achievement (Park & Bauer, 2002), health outcomes (Radziszewska, Richardson, Dent & Flay, 1996), social relationships (Turner, Chandler & Heffer, 2009) and even mental health (Vostanis et al., 2006) compared to the other approaches.

Conversely, an authoritarian parenting style is linked to overweight children (Rhee, Lumeng, Appugliese, Kaciroti & Bradley, 2006). Child feeding style is also linked with an authoritarian parenting style with more pressure to eat among 7 year-olds sons (Duke, Bryson, Hammer & Angras, 2004); a more controlling feeding style is also linked to authoritarian parenting (Blissett & Haycraft, 2008). However, not all the research is conclusive. Chinese parents are found to use more authoritarian parenting which is associated with academic achievement (Chao, 2001; Leung, Lau & Lam, 1998). Children of authoritarian parents have more depression compared to children of permissive parents (Dearing, McCartney & Taylor, 2006).

A permissive parenting style is found to be mostly used with overweight children (Moens, Braet & Soetens, 2006). Preschool children of permissive mothers are more likely to eat less fruit compared to other things (Hoerr et al., 2009). Blissett & Haycraft (2008) reported that permissive parenting mothers are restrictive, less likely to be monitoring and applying more pressure to eat. Some further research also introduces the idea of disengaged or neglectful uninvolved parenting (low in control and low in warmth), which often has the poorest outcomes overall, particularly for children living with additional stressors such as poverty (Pittman & Chase-Lansdale, 2001). In a preschool Head Start families (HSF) study in the USA, parenting with a more indulgent and uninvolved parenting style was linked to lower consumption of

fruit, juice, vegetables and dairy foods compared to authoritarian parents (Hoerr et al., 2009).

Research has shown that authoritative parenting styles are associated with a greater intake of fruit and vegetables (Berge, 2009; Patrick, Nicklas, Hughes & Morales, 2005), whilst permissive styles are associated with an increase in overweight (Hughes, Power, Fisher, Mueller, & Nicklas, 2005; Moens, Braet & Soetens, 2006; Pinquart, 2014; Rhee, Lumeng, Appugliese, Kaciroti, & Bradley, 2006). However, not all studies are conclusive (Vereecken, Legiest, De Bourdeaudhuij & Maes, 2009; Wake, Nicholson, Hardy & Smith, 2007).

Parenting styles have been associated with maternal child feeding style. Generally, mothers reflect a similar feeding style to their parenting style, either high or low in control and responsiveness (Wisniewski & Chernausek, 2009). For example, authoritative parenting is linked to higher levels of responsiveness, alongside a healthy level of monitoring over intake of snacks. Use of restriction and pressure to eat are low (Hubbs-Tait, Kennedy, Page, Topham & Harrist, 2008; Hughes et al. 2005). Conversely, authoritarian parenting has been linked to increased levels of restriction and pressure to eat (Duke et al. 2004; Hubb-Tait et al., 2008), and children generally eating a diet lower in balance and nutrients (Arredondo, Elder, Ayala, Campbell, Baquero & Duerksen, 2006). Finally, permissive parenting is associated with low monitoring of intake of snacks (Blissett & Haycraft, 2008) and using food to shape and reward child behaviour (Patrick, Hennessy, McSpadden & Oh, 2013).

Parenting styles are known to differ between ethnic groups. Generally, White British, American and European parents practice the highest levels of authoritative parenting levels compared with other ethnic groups (Park & Bauer, 2002; Shucksmith, Hendry, & Glendinning, 1995). For example, one study used National Educational Longitudinal Study (NELS) data to explore the relationship between parenting practices and high school students' academic achievement. European Americans were more authoritative in their parenting practices than all other groups of Asian Americans, Hispanics and African Americans. However, a significant relationship between having an authoritative parenting style and academic success was evident

only among European Americans – no significant association was found among other ethnic groups (Park & Bauer, 2002).

In another longitudinal study, 169 low-income Hispanic mothers of preschool children were requested to examine children's eating behaviours, mothers completed a questionnaire on feeding styles, feeding practices and acculturation. Immigrant mothers reported using more highly controlling feeding practices compared with those born in the US, including pressurising their children to consume more food, using food as a reward and restricting snack foods. Furthermore, Hispanic mothers who were first-generation immigrants were found to use a more authoritarian parenting style compared with Hispanic mothers born in the US who employed more indulgent styles (Power, O'Connor, Fisher & Hughes, 2015). Regarding permissive parenting styles, Hispanic parents are more likely to be indulgent compared with Black African mothers' uninvolved parenting (Hughes, Power, Fisher, Mueller & Nicklas, 2005).

Similarly, a study conducted to measure feeding practices and parenting styles among low-income minority Hispanic and African American parents found that authoritarian feeding styles are associated with higher levels of parental control, while authoritative feeding styles are related to higher parental responsiveness (Hughes, Power, Fisher, Mueller & Nicklas 2005). Overall, Hispanic parents are more likely to be indulgent with their children, whereas uninvolved parenting is higher among African American parents.

In another study utilising data from the National Education Longitudinal Study (NELS) to examine whether differences in parent-child interactions vary among racial groups, families with first-generation Asian and Chinese backgrounds were found to be more likely to adopt stricter authoritarian styles compared with White families (Kao, 2004). This was echoed in another study with 548 Chinese adolescents aged 12 to 15. The adolescents completed two parallel forms for both fathers and mothers to measure parenting styles (Parental Authority Questionnaire). The results showed that both Chinese mothers and fathers used higher-than-average levels of authoritarian parenting (Ang & Goh, 2006).

A study that Varela et al. (2004) conducted with 300 Mexican American and White parents and their children aged 10 to 14 found that Mexican American parents registered higher levels of authoritarian parenting practices than White parents. This study examined cultural factors related to parenting practices between these two groups: Parents completed the Parental Authority Questionnaire (PAQ), and their children completed the Cultural Lifestyles Inventory (CLI). Despite the proven use of authoritative strategies among both groups, this outcome suggests the existence of cultural variations related to the ecological context of Mexican descent.

Again, in a study of five ethnic groups in the US, White American parents registered lower levels of authoritarian parenting than African American, Asian American, Asian Indian and Hispanic mothers. This study measured 183 mothers' parenting attitudes using the Adult Adolescent Parenting Inventory (AAPI), the findings of which also revealed that ethnic groups place strict expectations, demands and controls on their children compared with European American parents (Jambunathan, Burts & Pierce, 2000).

A longitudinal study found that Mexican American parents use significantly more indulgent parenting styles associated with overweight children over a three-year period at the age of 8, compared with authoritative and authoritarian styles. This study was conducted only on low-income Mexican American families, in which parents were examined using the Parenting Dimensions Inventory (PDI) and BMI measurements taken from children (Olvera & Power, 2010). An indulgent parenting style was established among Hispanic mothers who were highly acculturated to US culture (Power, O'Connor, Fisher & Hughes, 2015).

The relationship between parenting styles and family conflicts associated with acculturation to the US was examined among 149 Asian college students. Findings show Asian American parents with more acculturation engaged in more permissive parenting than less-acculturated parents. Specifically, permissive parenting styles, indeed, reduced family conflicts, but authoritarian styles are conducive to Asian cultural values in general (Park, Kim, Chiang & Ju, 2010).

A study on differences in parenting styles showed that, compared with White fathers, Black fathers are more likely to be authoritarian, while Hispanic fathers tend to be permissive in their parenting. Explanations for these variances in levels of warmth are due to background differences, neighbourhood environment, and family structure among both Black and Hispanic fathers. Again, Black and Hispanic fathers show more responsibility compared with White fathers (Hofferth, 2003).

A positive association was found in a study examining the relationships between feeding practices and children's desire to drink sugary beverages among Hispanic and African American fathers. Low-income Hispanic fathers show high levels of using food as a reward or to control children's behaviour, a feeding style associated with children's increased consumption of sugary beverages among Hispanic preschool children compared with African American children. This study utilised three questionnaires: The Comprehensive Feeding Practices Questionnaire (CFPQ), Child Eating Behaviour Questionnaire (CEBQ) and Beverage Intake Questionnaire for Preschoolers (BEVQ-PS) (Lora, Hubbs-Tait, Ferris & Wakefield, 2016).

2.4.10 Maternal mental health and child weight

Maternal mental health and wellbeing has been linked to the risk of child overweight (Garasky, Stewart, Gundersen, Lohman, & Eisenmann, 2009). Mothers who are depressed are more likely to have impaired sensitivity and responsiveness toward their children that leads to either very strict authoritarian or disengaged parenting interactions with their children (Hughes, Power, Liu, Sharp, & Nicklas, 2015; Lovejoy, Graczyk, Ohare & Neuman, 2000; Pelaez, Field, Pickens & Hart, 2008). Likewise, high levels of maternal stress and anxiety can have similar patterns and is associated with more restrictive feeding, forceful and uninvolved parenting (Hurley et al., 2008).

Multiple potential mechanisms are described behind the association of stress and child obesity. Maternal stress creates poor eating habits and less physical activity that influences the child to develop a weight problem. From a biological perspective, family stress in different forms such as family disruption, parenting stress and parent-child conflict has been associated with greater cortisol levels causing metabolic syndrome related obesity. Parents with an uninvolved parenting style showed less

positive affect and more parenting stress that may promote less optimal child feeding behaviour leading to the development of childhood obesity. Low-income mothers who suffer from depression are associated with a more authoritarian feeding style and a lower level of family meal interaction. Thus, depression may restrain low-income parents from positive family interactions that maintain a healthy weight among children (McCurdy et al., 2014).

Maternal mental health has also been linked to child feeding style. Mothers who are higher in symptoms of anxiety are more likely to use higher levels of restriction (Mitchell, Brennan, Hayes & Miles, 2009). In younger infants, mothers with lower anxiety use lower levels of pressurising feeding styles (Brown, 2015; Hurley et al., 2008). Maternal anxiety during pregnancy has also been linked to greater restriction at one year (Farrow & Blissett, 2005). Conversely, depression has been linked to very low levels of monitoring and engagement, leading to an increase in snacks and less structure of mealtimes (Gemmell, Worotniuk, Holt, Skouteris & Milgrom, 2013; McCurdy et al., 2014), or in other research, pressure to eat (Francis, Hofer & Birch, 2001; Haycraft, Farrow & Blissett, 2013; Hurley et al., 2008).

Prevalence of depression varies between ethnic groups. In the USA, a study to measure major depression disorder (MDD) reported higher depression among Black Africans (56.5%) and Black Caribbeans (56.0%) compared to non-Hispanic Whites (38.6%) (Williams et al., 2007). Likewise, postpartum depression disorders in mothers are greater in both Hispanic mothers and Black African mothers compared to Caucasian mothers (Yonker et al., 2001). In a UK study of infant growth related to mental health distress symptoms between Pakistani mothers and White British mothers, Pakistani mothers reported higher somatic and depression symptoms than White mothers did (Traviss, West & House, 2012). Ethnic minority women in the UK, such as South Asian Indian and Pakistani and Black Caribbean women, experience greater depression and stress than their White British women counterparts in the UK. Furthermore, among ethnic minority mothers, those who were born outside the UK were less depressed than UK-born mothers were (Jayaweera & Quigley, 2010).

2.5 Exosystem factors

Factors at the Exosystem can also affect child weight, through creating the wider and less controllable environment in which the child grows up. These factors also affect the individuals at the microsystem level. Families behaviours are shaped or influenced through the environment in which they live in and as a consequence affect child weight status as part of the family member.

2.5.1 Socioeconomic status

Household income is a significant predictor of child overweight (Dubois & Girard, 2006; Gordon-Larsen, Adair & Suchindran, 2007; Strauss & Knight, 1999), although not all research is conclusive (Salsberry & Reagan, 2007; Shrewsbury & Wardle, 2008). Income itself per se does not affect weight, however a multitude of factors associated with low income increase risk of a child becoming overweight.

If money is sparse, food insecurity will likely be high, with poorer access to a varied, nutritionally optimal diet (Adams, Grummer-Strawn, & Chavez, 2003). Food insecurity is therefore linked to an increased risk of overweight (Melgar – Quinonez & Kaiser, 2004). Families who have no access to cooking facilities will struggle to prepare meals, even if they have the education to do so correctly (Tamayo, Herder, & Rathmann, 2010). Families from low SES backgrounds are also less likely to sit and eat together at a table, meaning meals are often eaten in front of the television and tend to be less nutritious (Neumark-Sztainer, Hannan, Story, Croll & Perry, 2003). However, this can also occur in higher income, busy working families (Campbell et al., 2002).

However, poverty affects wider interactions and factors. For example, mothers living in poverty are less likely to realise that their child is overweight compared to more affluent mothers (Baughcum, Chamberlain, Deeks, Powers & Whitaker, 2000; Warschburger & Kröller, 2009). Families from deprived backgrounds are also more likely to view a larger child as healthier as it is a sign that they have enough food (Baughcum, Burklow, Deeks, Powers & Whitaker, 1998).

Poverty can also affect feeding style, and pressure to eat (as food needs to be eaten) is higher amongst those living in deprivation (Feinberg, Kavanagh, Young &

Prudent, 2008), although not all studies are conclusive (Orrell-Valente et al., 2007). Patterns between restriction and SES are less conclusive, with some suggestion mothers higher in SES are more likely to restrict (Orrell-Valente et al. 2007), potentially as they are less likely to recognise their child as overweight or consider this to be an issue (Baughcum et al., 1998; Baughcum, Chamberlain, Deeks, Powers & Whitaker, 2000; Warschburger & Kröller, 2009). A clearer link is seen for monitoring. Lower SES are less likely to monitor intake of food, particularly for snack foods (Clark et al. 2007; Melgar-Quinonez & Kaiser, 2004).

Finally, use of emotional and instrumental feeding is higher amongst lower SES families, particularly around controlling behaviour or for reward (Chamberlain, Sherman, Jain, Powers & Whitaker, 2002). Using foods as a reward or to shape child behaviour by fathers was associated with increase child consumption of sweet sugar beverages among low SES Hispanic preschool children (Lora, Hubbs-Tait, Ferris & Wakefield, 2016).

Poverty is also associated with other factors associated with weight. Mothers with low SES are significantly more likely to use more permissive parenting styles (Grant, Compas, Stulmacher, Thurm, McMahon & Halpert, 2003). Minority ethnic groups in the UK are more likely to have higher poverty rates compared to the White population; the poverty rate for ethnic groups stands at around 40%, roughly double the figure for White British groups. The highest rate of poverty is for Bangladeshis (65%), Pakistanis (55%), 45% for Black Africans and 30% for Indians and Black Caribbeans (Platt, 2007). Differences in poverty level according to ethnic background are slightly obvious if different measures are used to examine poverty and deprivation, though the Bangladeshi ethnic group has the greatest poverty level compared to all other groups.

In the USA, the highest prevalence of poverty is among American Indians and Alaskan Natives at 27% and Black Americans at 25.8%. The poverty rate in other groups in the USA include: 23.2% among Hispanics, 17.6% among Native Hawaiians and Other Pacific Islanders, 11.7% among Asians compared to 11.6% among White people (Macartney, Bishaw & Fontenot, 2013). Ethnic minority families are more likely to live in areas of deprivation, where activity levels are often

lower (Gatineau and Mathrani, 2011a; Woodfield, Duncan, Al-Nakeeb, Nevill, & Jenkins, 2002).

2.5.2 Media

The role of the media is often discussed in relation to childhood overweight. Children who watch more hours of television each week are more likely to be overweight (Bacardí-Gascón et al., 2013). Watching higher levels of adverts for food promotions is associated with increased risk of overweight (Hawkes & Lobstein, 2011), due in part to increased likelihood of consuming those foods (Diaz Ramirez et al., 2013). Children often try to persuade their parents to buy them foods they see advertised on the television (Schreier & Chen, 2013).

Amount of television watched is also associated with a low income. Children from low income families are more likely to have higher viewing levels, alongside lower physical activity levels (Delva, Johnston, & O'Malley, 2007; Schreier & Chen, 2013). Time spent viewing is also inversely associated with maternal education (Kuepper-Nybelen et al., 2005).

In the USA, children from Black American and Hispanic families are more likely to have a higher level of television viewing compared to White American families (Delva, Johnston, & O'Malley, 2007). Black and Hispanic children have higher levels of TV watching due to the fact that they have a TV in their rooms, and a lower physical activity compared to White groups (Dixon et al., 2012). In the UK, an obesogenic lifestyle has contributed to an increased obesity level, with more TV watching and less physical activity among Asian and Black children living in more deprived areas than among White children (Falconer et al., 2014). Research also reports that South Asian girls have a higher level of sedentary behaviour; TV viewing can result in a negative energy balance because of the increase in the consumption of higher-energy snacking foods and drinks while watching TV (Hornby-Turner, Hampshire, & Pollard, 2014).

2.5.3 Ethnicity, culture – and the macrosystem

Ethnicity has its own position within the Ecological systems model. Ethnicity refers to the race an individual is born into. Ethnicity itself, as discussed previously, is

associated with numerous factors at the individual, micro and macrosystem levels that can affect obesity. However, ethnicity itself – specifically through its close ties with different cultural behaviours and beliefs – can help explain why a number of these differences arise. Ethnicity may directly affect weight in physiological ways e.g. through variation in body fat composition and genetics, but many of its behavioural links can be explained through exploring culture, and how culture affects individual choices (e.g. creating a mesosystem approach). Although the research discussed previously shows that a difference between groups occurs, culture can help explain why these differences occur.

Meanwhile, culture refers to the beliefs, norms, values and practices shared between particular ethnic groups. Each ethnic group typically has its own dominant culture, although of course not all ethnic groups will follow those cultural norms. Some groups have a stronger sense of belonging to their culture than others. Culture is passed down between generations and is part of constructing an individual's identity. It is about shared history and belonging. Shared values and norms and adherence to these are typically part of culture (Desmet et al., 2017). Culture embodies the influences at the macrosystem level.

Each ethnic group typically constructs its culture in different ways, with different rituals, practices and norms. These in turn will affect their behaviour and this includes how individuals perceive health and illness, and their subsequent behaviour in relation to their health (Chin & Noor, 2014). Individuals develop their understanding and knowledge of health through the cultural groups in which they are part of (Levesque & Li, 2014). Different cultures will hold different beliefs around health and illness and have different rituals and practices around how one maintains good health. These may or may not be within the control of the individual and can often be linked to outside forces such as God (Nayak, Sharada & Geroge, 2012).

A key aspect of culture is whether the group has a collectivist or individualist approach. Different cultures will put more or less pressure on individuals to follow the 'rules' of that culture, and in particular this is tied to whether a culture is individualist or collectivist (Basu-Zharku, 2011). In regions such as UK, USA, Europe and Australasia (where the dominant ethnic group is White) tend to be

individualist, believing that an individual is responsible for their own actions. In contrast, many South Asians, Chinese and other ethnic minority groups belong to collectivist cultures where others in the culture have a far greater influence over decisions and actions (Uskul, 2010). In many South Asian cultures, collectivism is valued with primary loyalty to the family, self-sacrifice and obedience and respect for elders (Shariff, 2009). This can affect health care choices, dependent for example on whose advice is valued and followed.

Involvement with extended family is often tied to a collectivist culture approach and family relationships are viewed as important, particularly in South Asian families (Jackson & Nesbitt, 1993). Grandmothers often have a central say in decisions around parenting and childcare, including food and diet (Kurrien & Vo, 2004). Extended family involvement is seen as a valuable support to family in providing advice, friendship, guidance, social and emotional support to mothers (Cooley & Unger, 1991). South Asian mothers often report that they deliberately seek advice from older generations such as their mother and mother in law for advice around child care and diet (Thomas & Avery, 1997). Cultural norms can therefore act as barrier when attempting to change behaviour because uncertainty of healthcare professional advice compared to elder and peer advice (Lucas, Murray & Kinra, 2013). This may impact on child eating behaviour and weight.

Culture also affects beliefs about how children should participate in family life and be raised. As noted above, levels of strict, authoritarian parenting are often higher in Chinese and South Asian groups compared to White British (Ali & Frederickson, 2011; Huang, Cheah, Lamb & Zhou, 2017; Lau-Clayton, 2014). This extends to beliefs around priorities for children and what is the best use of their time for children. This in particular can affect activity levels, as children have less free time to play, or participate in after school clubs. Research has shown that parents from Chinese backgrounds place more pressure on children to spend time studying, and to participate in family activities rather than spend time being active (Chao, 2000). Parents of South Asian children are also more likely to place higher encouragement and pressure on their children to excel at school, adding in extracurricular academic clubs rather than physical activities (Lee & Brown, 2006).

Religion is another key part of culture and ethnicity and religion can affect health beliefs and behaviours. Those with a strong Muslim faith for example may believe that all events are due to the will of God, taking a fatalistic approach of what will happen to them. This might affect their beliefs around health, their health behaviours and whether they will have treatment for illnesses (Hamdy, 2009). Religion can also affect beliefs around food and diet. For example, food is seen as a gift of God in Islamic faith. Wasting food is not acceptable (Eliasi & Dwyer, 2002). Similar beliefs are found in Hinduism. Food is considered as a gift from Annapurna Devi, the mother goddess worshiped for nourishment (Momin, Chung & Olson, 2014).

Religion can strongly affect aspects such as infant feeding too. The religious texts of both Hinduism and Islam, encourage mothers to breastfeed, and that the father must support his wife in doing so (Laroia & Sharma, 2006; Shaikh & Ahmed, 2006). However, religion can also lead to less healthy practices around when infants should first have milk and what other foods they should have. Many cultures delay the first feed to undertake religious ceremonies (Aborigo et al., 2012; Geçkil, Şahin & Ege 2009). Avoiding giving colostrum (the milk produced in the first days after birth that is full of antibodies is also common as it is seen as dirty or too thick (Wanjohi et al., 2017). Instead, pre-lacteal feeds are given such as porridge, sugar, honey or ghee, believed to cleanse and strengthen the baby (Legesse, Demena, Mesfin & Haile, 2014). Although these practices are predominated in Africa and South Asia where access to education can be different, many of these practices are related to religion, cultural rituals and family beliefs, leading to many families from South Asian and Black backgrounds in the UK giving special foods to infants or avoiding giving colostrum (McFadden, Renfrew & Atkin, 2012; Twantley et al., 2010).

Identity as part of a culture or ethnic group is strongly tied to other decisions around food and cooking (Kumanyika, 2008). Food and cooking become part of identity and belonging to the cultural group, and strong traditions develop around food that individuals of that group must then adhere to, in order to participate fully in the culture (Lawton et al., 2008; Vallianatos & Raine, 2008). Food therefore becomes not only tradition but as part of emotion and belonging (Maiter & George, 2003), and allow people to belong to a social group or identity. Family expectations to participate are high (Lucas, Murray & Kinra, 2013). Food is not just about nutrition,

but coming together as a family. Food is about hospitality and showing others that you care. The social norm is to welcome people and show you want them in your house by cooking them food. If food is rejected, or not offered, this is not simply about being not hungry or a taste preference, but instead a decision to reject or abandon community, family and religion (Gabaccia, 1998). Given the connections established above between emotional feeding, emotional eating and child weight, potentially this may be having a negative impact upon child weight.

Traditional foods are a key to this and for those who have left a home country to live in the West, cooking, preparing and sharing these foods can help in maintaining ties to a home country and feeling like the transition is eased (Chowdhury, Helman & Greenhalgh, 2000). There are strict rules around preparing these foods, and specific foods are often given for particular occasions or rituals (Mukherjea, Underwood, Stewart, Ivery & Kanaya, 2013). It would not be acceptable to serve an adapted dish, lower in fat or spice for example (Grace, 2011). Preparing food in South Asian culture is also tied closely to the role of a mother and the identity of being a mother. Women are seen as responsible for preparing and cooking food, and for making sure that those in their family have eaten. In turn, she models how to prepare and offer food to others and to her children (Bush, Williams, Bradby, Anderson, & Lean, 1998). However, traditional Asian foodstuffs, such as meat, ghee and traditional sweets, and traditional ways of cooking can be high in calories and fat, leading to overconsumption, especially if eaten in the absence of hunger (Anderson et al., 2005; Chowdhury, Helman & Greenhalgh, 2000).

History and context of the 'home' country can also play a role in perceptions and preferences for child weight. In countries where food has traditionally been sparse, a larger body is coveted as it is seen as a sign of health, but also prosperity, security and power. Therefore, preferences amongst Black, Latino and Hispanic mothers that a larger child is desirable are linked to these beliefs (Eckstein et al., 2006; Killion, Hughes, Wendt, Pease, & Nicklas, 2006; Pasch et al., 2016).

2.5.4 The role of acculturation

In the Ecological systems model, the macrosystem refers to the wider culture of a country or region, typically representing the dominant group culture. As noted above,

the British population is over 92% White British suggesting that White British norms are the dominant group. So although ethnicity fits within the exosystem, the wider influence of an opposing culture at the macrosystem affects individuals who are not in the dominant group.

How much an individual fits with their own culture or that of the macrosystem is referred to as acculturation. Caprio et al. (2008, p. 2215) defined acculturation as: 'changes of original cultural patterns of one or more groups when they come into continuous contact with one another'. Acculturation is described as a long process in which individuals together learn and modify specific parts of their shared values, norms and behaviour involving diet and lifestyle. Immigrant parents' assimilation into different social, cultural, linguistic, and economic circumstances shapes children's acculturation and influences the children's health and well-being (Mazur, Marquis & Jensen, 2003).

Acculturation can have an impact on many behaviours, as those immigrating to a country start to adopt, or integrate the behaviours of a majority group (Arshad, 2007). Conversely, individuals may want to keep hold of traditional behaviours, and keep these separate to the dominant culture, continuing to participate with others from their cultural groups. Individuals can adopt both strategies – assimilating some ideas into their new lives, but also keeping others separate (Berry, 2001).

Degree of integration is also an aspect. This involves engaging in the dominant culture and social norms while maintaining one's existing culture and behaviours that opposite of less interaction or resistance in the form of separation because of fear or loss of cultural values (Berry, 2008). However, individuals can also become marginalised, where they feel less interest in a relationship with the dominant culture due to discrimination and exclusion and an interest in maintaining cultural values from loss. This acculturation has been recognised as the process of how individuals incorporate values, beliefs and behaviour from a host culture. The acculturation process for the UK and USA includes different and multiple levels of modification, survival, adaptation, domination, resistance and stress (Berry, Phinney, Sam & Vedder, 2006; Nwadiora & McAdoo, 1996).

Acculturation can affect behaviour and, therefore, health. A research study into diverse families of different nationalities and ethnicities who migrated to the UK explored adverse effects which influence parents in relation to children's health behaviours. Migration to the UK was viewed as a way to provide a better life to preschool children, but parents encountered significant life changes post-migration. For example, in one study, a focus group of mothers who emigrated from Pakistan, Somalia, Romania and Poland reported a number of unexpected negative consequences, including financial difficulties, while others felt unsafe allowing their children to play outside, both of which can contribute to obesity (Condon & Mcclean, 2016).

Often, health can decline rather than improve as expected. For example, in a comparative study conducted through a phone survey of Latino and White non-Latino adults aged 35 to 74, Latino immigrant families integrating into US culture were more likely to increase their unhealthy behaviours. Specifically, women were more likely to take up smoking and alcohol use, as well as experience a decline in dietary habits. Less-acculturated Latino families were more likely to consume healthy foods than more acculturated Latino families (Otero-Sabogal, Sabogal, Perez-Stable & Hiatt. 1995).

Acculturation can also affect children's diets, as children become exposed to two different food cultures, and rather than switching diets, they participate in both (Lawrence et al., 2007). In the UK, a study using food diaries and in-depth interviews and open-ended questionnaires with Asian and White teenagers found that unhealthy Western 'fast foods' tend to work their way into Asian children's diets as they acculturate to a new country. Schools and new friendships exacerbate this, with Asian children eating typical Western foods in schools, while also continuing to eat traditional meals at home (Sheikh & Thomas, 1994). Similar findings were identified in focus-group research with 13 Black African and South Asian teenage girls. Participants identified how they often ended up eating unhealthier Western foods (fast foods) when walking home with their friends, while also eating traditional meals once they arrived home (Lawrence et al., 2007).

Peer pressure can play a role in this as well. An ethnographic study by Lofink (2012) used interviews and a questionnaire to assess the factors that influence children's eating patterns. This study, conducted with 447 British South Asian teenagers aged 11 to 14, examined how aspects of locality, history and practices help foster an obesogenic environment. The findings indicate that this group encountered lots of pressure from its peers to eat foods that commonly were part of the Western diet, including energy-dense snack foods at school and on the way home. Moreover, an important overlap between cultural and structural pressures encourage this group to consume energy-dense foods frequently around schools and in their communities in general, with low-SES neighbourhoods playing a role. However, this study did not make comparisons with other ethnic groups, nor did it explore differences within broader groups, e.g., potential differences between Bangladeshi and Pakistani children.

Gilbert & Khokhar (2008) also found that second-generation South Asian mothers reported eating increasingly more Western foods, which are more often higher in sugar than traditional foods. A similar cross-sectional research project that examined generational differences in lifestyle changes to explain obesity patterns in UK ethnic minorities showed that second-generation South Asians tended to display similarly unhealthy dietary behaviour compared with White Britons. Compared with all other ethnic groups, Pakistani/Bangladeshi, Black African/Black Caribbean, second-generation Indian and Chinese groups were significantly more likely to be obese compared with the first generations (Smith, Kelly & Nazroo, 2011). These are excellent examples of both assimilating and separating behaviours, as Berry (2001, p. 619) notes: The new norm is adopted, but the old norm remains.

Acculturation also has an impact on early infant feeding practices. The longer mothers who originally come from cultures where breastfeeding is the norm live in the UK, the lower their likelihood of breast feeding. Evidence shows that immigration to the UK has a detrimental effect on breastfeeding in particular among South Asian mothers with a high acculturation level. Less acculturated mothers may be less affected by the dominant UK formula feeding culture than highly acculturated mothers in Britain. However, when South Asian mothers who had recently migrated gave formula milk rather than breast milk it was in response to their child's demand

for more food or to reduce conflict with older family members in the household (Choudhry & Wallace, 2012).

In the USA, Allen et al. (2007) found that the longer an individual lived in the USA the unhealthier their diet became. Specifically, Latino diets changed from better than White Americans (fruits and vegetables consumption) to worse (soft drinks and 'junk foods') than Whites Americans. Other research has shown an increase in high fat and sugary foods amongst Hispanic immigrants to the USA, increasing the longer they lived in the region (McArthur, Anguiano & Gross, 2004). Intake of sugary foods such as soft drinks and fruit juices has also been shown to increase amongst Hispanic children who have immigrated to the USA (Salvo et al., 2012). Finally, US-born Asian American and Hispanic adolescents are more likely to be obese compared to Asian and Hispanics outside of the US, clearly showing that it is country based norms rather than ethnic group that contributes (Popkin & Udry, 1998).

In a study among Hispanics, both US-born adolescents and foreign-born adolescents, the results showed that Hispanic US-born adolescents are more likely to be obese compared to Hispanic foreign-born adolescents and this is associated with acculturation. Hispanic traditional cuisine includes consumption of low-fat foods such as beans, rice and vegetables and this tends to decrease with greater US acculturation (Gordon-Larsen, Harris, Ward & Popkin, 2003).

Acculturation also has an impact on activity. In the USA, research has found that Hispanic and Asian American adolescents become less physically active upon arriving in the USA (Unger et al., 2004). Parents often exacerbate this as they buy items such as video games and computers to help their children fit in, but in turn make them less active (Small, Melnyk, Anderson-Gifford & Hampl, 2009). Adolescents' physical activity for the first generation (less acculturated) Hispanics is lower in comparison to third generation Hispanics (more acculturated); even obesity prevalence was higher in non-English speaking homes (Liu, Probst, Harun, Bennett & Torres, 2009). Physical inactivity is higher among immigrant children compared to native-born children. Hispanic immigrants' children are 22.5% physically inactive compared to the US-born Hispanics (9.5%). In addition, physical activity

participation is lower in less acculturated Hispanics (67%) compared to native Asian Americans (30.2%) (Singh, Yu, Siahpush & Kogan, 2008).

Being part of a minority culture also brings with it stressors that may affect behaviour and weight. Barriers to a healthy lifestyle can also be stronger amongst minority ethnic groups for reasons associated with lower acculturation. Language barriers can impact on physician-patient agreements about medication regimens during medical encounters. Latino patients with poor English language skills are hindered in their understanding of physician-patient agreements at the lowest percentage in the area of medications around (60%) (Clark, Sleath & Rubin, 2004).

Beliefs around the importance of alternative medicines may also affect health behaviours. In the US, Hispanic and Black ethnic groups are more likely to use complementary and alternative medicine (CAM) compared to non-Hispanic Whites. Compared to non-Hispanic Whites, the use of herbal remedies and chiropractic were higher among Hispanics and Black Africans (Mackenzie, Taylor, Bloom, Hufford & Johnson, 2003). Extensive use of herbal medicine is reported by Asian American mothers, specifically Chinese and Japanese women (Bair et al., 2002).

Racism can also play a role. Ethnic minority populations can experience significant racist encounters, from the more subtle and indirect, to the more threatening. This can have a knock on effect onto areas such as relationships, income and feelings of safety and security (Kumanyika, 2008). For example, anxieties over racial discrimination can also discourage families from ethnic minority backgrounds from letting their children play outside (Li, Dibley, Sibbritt, & Yan, 2006). Parents' safety concerns about their neighbourhood can contribute to barriers that hinder Hispanic girls' participation in physical activity (Springer et al., 2009). Immigrant parents reported that neighbourhood safety is also a factor that affects their physical activity (Hosper, Nierkens, Valkengoed & Stronks, 2008). Racial discrimination that is experienced through residential segregation may influence individuals to be active and participate in physical activity. The condition of poor Black African neighbourhoods as less safe and pleasant for physical activity, restrain individuals from being active compared to those in the more affluent White neighbourhoods with more facilities in the area (Boslaugh, Luke, Brownson, Naleid & Kreuter, 2004).

Being part of a minority group, particularly if having immigrated from a new country, can be stressful. Factors such as social disruption, the stress of immigration, loss of community can all lead to increased levels of stress and depression amongst ethnic minority women (Reddy & Crowther, 2007; Sahi & Haslam, 2003).

Racism is also strongly tied to history. For example, complex social factors explain why mothers from Black American backgrounds are less likely to breastfeed. Whereas breastfeeding is seen as 'normal' amongst ethnic minority groups in the UK, numerous influences work against Black women in the USA. These include false assumptions by professionals that they simply won't breastfeed, so do not offer support, alongside stressors such as an increase in poverty and social isolation (Gross et al., 2015). History also plays a large role. Only relatively recently were Black women often used as slaves, to wetnurse the babies of their 'master'. This history has impacted on the view that to not breastfeed is a sign of freedom, power and choice (Reeves & Woods- Giscombé, 2015).

2.5.5 The limits of classifying ethnicity

Bringing all the research discussed above together shows that ethnicity is a significant influence upon child weight. However, caution must be taken in how this classification is applied. Although classifying individuals into ethnic groups can be a useful tool for making broad comparisons, it should be recognised that not everyone will fit the culture and beliefs of their particular ethnic group. It allows generalised comparisons to be made between groups, but it should be remembered that there are many inter as well as intra comparisons between groups. For example, in the UK census, South Asian groups are banded together. This includes those from Asian Indian, Asian Pakistani and Asian Bangladeshi. It is possible that variations may be found within as well as between these larger groups, and of course, even at that sub level, only general patterns can be drawn not individual conclusions (Bhopal, 2007). Care must be taken not to over generalise and suggest that everyone who falls within a certain ethnic group is in some way the same.

The potential negative impacts of research should also be considered. Publicly categorising people in this way can lead to marginalisation and exclusion, especially for groups who have a history of tensions and vulnerability (Aspinall, 1997).

Research often lacks wide descriptions of population characteristics, treating fluid and multidimensional, contextually specific concepts as a mean of a fixed and stable conception (Burton, Nandi, Platt, 2010). Labelling of ethnicity in research is often wide and inappropriate.

Bhopal states that ‘ethnicity is a multi-faceted quality that refers to the group to which people belong, and/or are perceived to belong, as a result of certain shared characteristics, including geographical and ancestral origin, but particularly cultural traditions and languages’ (2004, p. 441). Defining a person’s ethnicity is complex and appropriate accuracy in using terminology remains controversial. Labels can hide significant heterogeneity of cultures. For instance, the term White is often used as a key descriptor of a sample; this refers to individuals of English, Welsh, Irish, Scottish, New Zealander, Greek, Spanish or Canadian descent (Bhopal & Donaldson, 1998).

There is also a tendency for researchers (who are often themselves from White backgrounds) to always use White populations as the default comparative group. Ethnic minorities are compared to the ethnic majority group. Of course from a research and statistical standpoint this might be expected – comparisons are often made to the largest reference group. However, this approach could also be interpreted as White ethnicities being viewed as the ‘normal’ group (rather than simply the most common) or even the desired norm from which others deviate (Bradby, 2003).

However, standardised classification of ethnicity is very common in health sciences research due to its ability to examine patterns between groups and use information to tailor health interventions (Bhopal, 2007). Identifying broad differences between groups can help direct tailored support to communities (Chauhan, 2008). However, care must be taken disseminating these findings to make sure messages do not exacerbate racial tensions or stereotypes (Bradby, 2003).

Aims of thesis:

Bringing everything together, given the importance of tackling the continued issue of childhood obesity, and evidence specifically showing that childhood obesity is

increased amongst Black and South Asian groups in the UK, it is vital that further research is undertaken to understand why these differences are emerging. Understanding how childhood obesity risks differ between ethnic groups is critical to developing services that can be tailored to the needs of different populations, rather than simply thinking that findings can be generalised from a dominant White population (Mir et al., 2013).

As noted above, although research in the USA has typically explored differences in the factors that affect obesity between ethnic groups, this is not sufficient for generalising to UK samples. Research conducted in the United States has focused on dominant ethnic minority groups in that region - African American and Mexican families (Hughes, Power, Fisher, Mueller, & Nicklas, 2005; Skala, et al., 2012; Ventura, Gromis & Lohse, 2010) - whilst the largest non-White ethnic groups in the UK are Asian and Asian British. Additionally, demographic make-up is different; in the UK only 13% of the UK population is non-White compared to 29% in the USA (ONS, 2016; United States Census Bureau, 2010).

To bring the findings together and highlight the evidence gap from a UK perspective, table one considers the volume of research conducted in each of the key influences identified upon childhood obesity. It considers whether the body of the research in that area consists of numerous papers (considerable research), some papers in the area with gaps missing (partial), a few papers published on the topic (sparse) or no identified research (none). This table draws on the critical analysis table in appendix (1A).

The table highlights how research is particularly sparse at the microsystem level, specifically in terms of maternal influences upon child weight. Findings from the USA suggest that this area may have significant differences between ethnic groups, but as noted above, research needs to be specific to the UK.

Table 1: Bringing the findings together

Ecological systems level	Factor	Research between ethnic groups in Western cultures?	Research between ethnic groups in UK?
Individual	Diet	Considerable	Considerable
	Activity	Considerable	Considerable
	Genetics	Considerable	Partial
	Prenatal factors	Considerable	Partial
	Early nutrition	Considerable	Partial
Microsystem	Weight/Body shape	Considerable	Partial
	Maternal child feeding style	Considerable	Sparse
	Maternal own eating behaviour	Sparse	None
	Maternal mental health	Considerable	Sparse
	Maternal parenting styles	Considerable	Sparse
Exosystem	Poverty	Considerable	Considerable
	Neighbourhood	Considerable	Considerable
	Media	Considerable	Sparse
Macrosystem	Cultural beliefs	Considerable	Considerable

The aims of this thesis are therefore to explore this research gap by:

1. To examine whether maternal influences, in particular maternal feeding styles that are associated with child weight would differ between ethnic groups in the UK.
2. To explore why these differences may be occurring.

Chapter 3

Exploring health and child care practitioners understanding of ethnic differences in childhood overweight and obesity in the UK

3.1 Background

The UK National Child Measurement Programme was established in 2006/2007 to weigh and measure every school-aged child at five and eleven years old. Having recently published its latest report, the programme has consistently shown that over one in five children in reception and one in three children in year 6 in the UK are considered overweight or obese. This is a significant issue not only for their physical and emotional health (DH, 2017a) but also from the economic perspective of treating obesity-related ill health, which was estimated to be £6.3 billion in 2015 (Baker, 2017).

Variations in levels of childhood obesity have also occurred within each report, based around three main factors: poverty, rurality and ethnicity. Higher deprivation and greater rurality are both associated with an increased risk of overweight and obesity. In addition, children from Black and South Asian backgrounds have the highest levels of overweight and obesity compared to White British children, with children from Chinese backgrounds having the lowest risk (DH, 2017a). In reception year, the obesity rates ranged from 7% for Chinese children to 15% for Black children. Around 29% of Black/Black British children are either overweight or obese. In year 6, the obesity rates ranged from 17% for Chinese children to 29% for Black/Black British children. Approximately 45% of Black and 39% South Asian children are either overweight or obese. The prevalence rates of overweight and obesity for White British children ranged from 22% to 33% in reception and in year 6, respectively. These findings are not in isolation, with research typically showing higher childhood obesity levels in Black and South Asian groups compared to White British children (Connelly, 2011; Cronberg, Wild, Fitzpatrick & Jacobson, 2010; Harding, Teyhan, Maynard & Cruickshank, 2008).

The pathways between childhood obesity and poverty (Schreier & Chen, 2013) and rurality (Johnson & Johnson, 2015) are well established. However, as presented in

the literature review research exploring the link between ethnic background and childhood obesity from a UK perspective is relatively sparse. Although the physiological and environmental pathways to childhood obesity have been well researched in the UK, notably much of this work has been criticised as being conducted with White samples. Ethnic variation in findings is rarely reported in UK research, whereas in other countries such as the USA this is studied in more depth.

Research that has explored ethnic variations in childhood overweight and obesity in the UK has focussed predominantly on genetic influence, differences in nutrition and activity and the confounding factor of poverty. For example, research has shown that South Asian populations have a greater genetic risk of obesity than White European populations (Shinozaki & Okuda, 2012). Meanwhile, in terms of diet, intake of energy and fat tends to be higher in Black and Asian children compared to White children in the UK (Gatineau & Mathrani, 2011a), whilst children from Black and South Asian backgrounds have been found to have lower levels of activity compared to White British children (Falconer et al., 2014). Finally, children from Black and Asian families are also more likely to live in deprivation which is a factor known to be linked to higher obesity rates (Schreier & Chen, 2013).

However, the pathways to childhood overweight and obesity are recognised as far more complex than simple decisions around diet and activity and include the influence and interaction of both genetic and environmental factors (Wardle, 2005). For example, research has shown how factors such as parental attitudes towards child weight (Ventura & Birch, 2008), parenting style (Berge, Wall, Loth & Neumark-Sztainer, 2010), parents own diet and activity (Gatineau & Mathrani, 2011a), perceived neighbourhood safety (Bacha et al., 2010), advertising (Diaz Ramirez et al., 2013) and even family size (can all impact on a child's eating behaviour and therefore weight (Khader et al., 2009).

Despite these known psycho-social-cultural influences upon child weight and how there may be ethnic variation in experience of these in other countries, questions examining ethnicity are absent more often than not when looking at broader UK research. There is therefore a clear need for research to start exploring these factors in UK samples but what areas are relevant? Given this scarcity of evidence, the aim

of this first study was therefore to explore the factors that health and social care professionals (who work directly with children across a range of ethnic backgrounds) believe to be the reasons for the differences in childhood obesity between ethnic groups identified in the National Child Measurement Programme. These individuals are involved professionally in supporting families in terms of health, education and social development and their experiences may offer insight into why differences in child weight may be occurring between different ethnic groups in the UK.

3.2 Methodology

Design

Due to the exploratory nature of the research question, a methodology that allowed new data and ideas to emerge was adopted. A self-report questionnaire was used, consisting of open-ended questions to allow for participants to offer their own thoughts and experiences. Open-ended survey responses are often used to collect new information about an experience, and to explore respondents' views on why something occurs in their own words, rather than pre-determined ideas (Jackson & Trochim, 2002).

Participants

All participants gave informed consent prior to inclusion in the study. All aspects of this study have been performed in accordance with the ethical standards set out in the 1964 Declaration of Helsinki. Approval for this study was granted by Swansea University Research Ethics Committee on 24/11/2014.

Participants were healthcare professionals with a role in child health working with families of primary school aged children (4 – 11 years) in public health, primary and secondary care in the UK. This included, but was not limited to health visitors, school nurses, dieticians and general practitioners. Participants were specifically sought who had experience of working with families from ethnically diverse populations.

Data collection took place between January and May 2015. Participants took part in the study through completing an open-ended questionnaire hosted online. Recruitment took place by contacting key professionals across the UK who worked in child health in areas of high ethnic diversity via email. All participants had publicly available online contact information which was used to generate invitations via email.

Recruitment emails explained the aims and background of the study with a link to SurveyMonkey™ included if they wished to take part (see Appendix 2A). This ensured that participants did not feel under pressure to consent and also increased the likelihood of participation as they did not need to get in contact with the researcher (although researcher details were given for any questions).

If participants chose to click on the link, the survey loaded with a full information sheet describing the study aims and methods in detail. Completion of informed consent questions were required for the survey questions to load. Contact information was given for both the researcher and supervisor. A debriefing page loaded at the end of the questionnaire. Participants could also request a paper copy of the questions which contained the same information and consent forms and details on how to return to the researcher anonymously.

In order to gain a UK wide relevant understanding, professionals were approached from across the UK, particularly from areas with an ethnically diverse population (e.g. Birmingham, Leeds, London). Participants were asked for the first three letters of the postcode in which their work was based to ensure a UK base and to measure the geographic spread of participation. The professional networks of the research supervision team were also used to disseminate the study. Adverts were also placed on social media (Twitter, Facebook), advertising the study to relevant individuals, giving brief information about the study and the SurveyMonkey™ link. Participants were also encouraged to share the study information with their professional networks.

Participants clicked on the link to the survey for further information. Utilising this method allowed a wide range of professionals to be reached, not only through the

direct contacts of the research supervision team, but through further sharing of the study advert online. It also allowed specific groups to be approached as hashtags could be used to highlight the study to relevant individuals who follow that hashtag. Moreover, specific groups on Twitter such as 'we school nurses' could be directly tweeted to. Members of the group could then choose to follow the link.

This multifaceted approach allowed a range of participants with this specific expertise to be recruited to the study. The use of an online questionnaire further supported this method, not only allowing respondents from across the UK to take part, but also enabled participation in their own time. A very positive reaction was received from twitter users in using this method and this is considered further in the discussion alongside limitations of the approach.

Measures

Participants completed an open-ended questionnaire hosted by SurveyMonkey™. Participants gave location and occupation. As this study was exploratory, only three further questions were posed, examining participants experiences of working with families across ethnic background and their beliefs about data presented in the NCMP report. Participants were encouraged to give as full answers as possible. Questions are shown below in Table two.

Table 2: Open ended questionnaire items

1. What is your experience working with, or advising on policy, for children and family from a range of ethnic backgrounds?
 2. The data from the NCMP shows that children from a Black, Black British, Asian or Asian British background have a higher BMI on average compared to children from a White background, whilst children from a Chinese background have a significantly lower BMI than all groups. Do you feel that the data reflects your experiences working with families? How? Or why not? Or - do you have experience of working with different ethnic groups?
 3. Why do you think the differences in childhood overweight and obesity shown in the NCMP might have occurred amongst children from the different ethnic groups? Do you think it could be related to variations in diet or exercise, attitudes about how children are fed, beliefs about ideal weight, wider socio-demographic factors - or indeed simply a genetic variation? You could refer to any period of time e.g. pregnancy, infant feeding, preschool or school age factors. If you do not feel there is any explanation for the data, please feel free to say so.
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Data analysis

Data were downloaded into excel and SPSS directly from SurveyMonkey™. No participant requested a paper copy. Data analysis then took place in several stages:

Firstly, a simple qualitative descriptive approach was used to analyse the data (Sandelowski, 2000; 2010). Qualitative descriptive approach is less interpretive compared to phenomenological or theoretical approaches and provides closer findings to the data. Given the exploratory nature of the study and the description of ideas and / or experiences, this was a suitable method for data analysis compared to grounded theories or Foucault inspired discourse studies (Sandelowski, 2010).

As part of this a thematic analysis was conducted. This involved reading through each script to understand the themes that emerged. This analysis was conducted both

across each individuals responses for the whole questionnaire and across each question for the whole sample. All responses were considered together in deciding the emerging themes e.g. not question by question. As the themes were identified they were then split into key themes and sub themes. Once completed the themes were examined by a second coder with agreement occurring in over 90% of cases.

The sample size exceeded that required for qualitative analysis and data saturation occurred for the main themes within 12 scripts. However, the larger sample size enabled a content analysis to be performed for the themes and sub themes that emerged. Using the SPSS spreadsheet, participants were coded as yes/no for identifying each theme and sub theme. This allowed a count of themes to be conducted.

A content analysis approach was then used to analyse the data. Content analysis enables qualitative themes to be represented quantitatively, through counting the number of times themes appear throughout the data (Mayring, 2000). Krippendorff (1969, p. 103) defines “content analysis as the use of replicable and valid method for making specific inference from text to other states or properties of its source”. Inductive content analysis is suitable when few or no previous studies of the phenomenon in question exist as well as it enables themes to be identified in the raw material.

Participants’ occupation was coded into professional group. This enabled descriptive and inferential statistics to be performed in conjunction with the themes raised e.g. did a certain professional group identify a specific theme more often? Descriptive statistics were used to calculate frequencies and chi square to examine associations between occupational group and themes.

3.3 Results

Forty eight responses were received of which eleven responses were excluded. Seven responses were excluded due to very short or missing responses (e.g. completed one or two questions or gave a brief answer such as yes). One participant was excluded due to not having a relevant professional background. Of those remaining in the

analysis, respondents included 13 school nurses, 12 health visitors and a midwife, 4 general practitioners, 4 paediatricians and 3 practice nurses).

The thematic analysis revealed eight main themes, broken down into 17 sub themes. Main themes included diet and activity, parenting style, cultural influences, body image ideals, early influences and family influences, genetics and demographic background (Table 3)

Table 3: Themes and sub-themes in the data

Theme	N	%	Rank	Sub-theme	N	%	Rank
Diet / Exercise	34	91.9	1	High energy diet	20	54.1	1
				Low physical activity	14	37.8	4
Parenting style (strict/control)	31	83.8	2	Feeding style	20	54.1	1
				Activity / freedom to play	11	29.7	6
Influence of culture	21	56.8	3	Cooking	12	32.4	5
				Activity / celebration	9	24.3	7
Body image ideals	17	45.9	4	Parent ideal image	15	40.5	3
				Parental own body image	2	5.4	13
Demographics	17	45.9	4	Poverty and income	17	45.9	2
Early influences	14	37.8	5	Pregnancy	3	8.1	12
				Infant feeding	3	8.1	12
				Early introduction to solid foods	8	21.6	8
Family influence	13	35.1	6	Information from family members	6	16.2	10
				Ignore professionals	7	18.9	9
				Family size	5	13.5	11
Genetic	11	29.7	7	Genetic susceptibility	6	16.2	10
				Body composition	5	13.5	11

These themes fitted well within the Ecological Systems Theory (EST) approach to obesity as depicted previously in Figures one and two (p. 23, 25), suggesting influences directly related to the categories of individual child, those immediately around them (microsystem), broader social influences (exosystem) and wider culture (macrosystem). Sub themes and the number of participants suggesting each theme and sub theme is shown in Figure two and discussed in more detail (see chapter 2).

Category one: Individual child level

Theme one: Genetic / biological

Participants identified a number of genetic and biological factors that they believed might explain the differences in child weight. This included the issue of differences in genetic inheritance of weight patterns, but also referred to the concept of differences in body composition. Examining the two suggestions, the underlying concepts were very similar; the belief that weight was determined by inheritance of disposition to be a certain weight.

Genetic susceptibility

Participants identified a number of genetic and biological factors that they believed might explain the differences in child weight. Genetic susceptibility was raised by 6 (16.2%) of healthcare professionals in the questionnaire. Participants believed that children were predisposed to be a certain weight and this was affected by the ethnic background of the child.

I do feel that genetic disposition has a lot to do with it. (School nurse 4)

I think there is possibly some genetic explanation. (Practice nurse 1)

However, a number of the participants added the proviso that it was not genetic inheritance alone that led to weight differences. Environmental factors were also believed to have an additional role, with the two working additively to affect child weight.

I think you need to be careful not to think this is just lifestyle choice though as genetics affect child weight too. (GP1)

I think there will be genetic variations but there will be lifestyle factors as well. (GP 2)

One health visitor expanded noting that genetic susceptibility should not determine weight. Although it was an influence, lifestyle should be adapted to promote a healthy weight.

I do not think genetic variations should account for obesity because every person needs to be aware of the amount of food their body needs. (Health visitor 3)

Body composition

More specifically than general genetic susceptibility to weight gain was the belief that bone structure and general body composition were hereditary and could differ between ethnic groups was raised by 5 (13.5%) of health professionals. Children from black ethnic groups were perceived to be stronger and have heavier bone structure whilst children from Chinese backgrounds were perceived to be slighter.

Those from black backgrounds tend to have a heavier bone structure and musculature than those from White backgrounds. (Health visitor 5)

I would also say anecdotally as we see less children, that those from Chinese backgrounds are much more likely to be underweight but they do have a slighter build until I realise that is just how that child is meant to be. (School nurse 1)

However, alongside this genetic and biological susceptibility, most participants raised the idea of environmental influences playing a role in differences in child weight.

Theme two: Diet and exercise

A key theme that ran throughout responses was the issue that differences in diet and activity were felt to affect weight. Thirty four (91.9%) health professionals mentioned how diet of ethnic minority children often had high calorie intake and levels of activity were low.

High energy diet

A common belief was that the South Asian diet in particular was more likely to be enriched with fatty and oily foods as well as low vegetables and fruits consumption.

Research has shown that families from Asian backgrounds have a higher energy diet. (Paediatrician 1)

There is a fattier component to the diet that children from Asian families seem to receive. (Health visitor 12)

Low physical activity

Alongside higher energy diet, Asian children were believed to have lower physical activity in general compared to Caucasian children as accounted for 14 (37.8%) of health professionals in the responses. This included organised sporting activities but also general activity as a family and play.

I would say a diet that is higher in fats and carbs and less overall physical activity. (SN 6)

I find certain ethnic minorities take in less exercise (Asian families), go walking less, and go cycling less. (Paediatrician 4)

In particular, Asian girls were perceived to have the lowest activity level participation compared to other ethnic groups.

I think an attitude to freedom is a big thing. I've noticed the Asian children tend to run around less particularly the girls. (School nurse 12)

Related to these physiological factors, participants raised a number of psychological, social and cultural issues that explained these differences in diet and activity level.

Theme three: Early influences

Although participants were asked to reflect on influences upon the weight, activity and eating behaviour of school children, a number raised early influences upon these issues. For example, differences in behaviour during pregnancy and infant feeding and their perceived connection with later weight were discussed. These early experiences were felt to influence children's development from the start of life.

Pregnancy

Pregnancy was felt to be one period where differences in weight began to emerge. Mothers from Asian backgrounds as mentioned by respondents were felt to be at increased risk of overweight, which affected the baby during pregnancy, leading to higher birth weight and affecting food choices from the start.

Mothers who are overweight will affect infant weight in pregnancy and then food choices and behaviours in the first year will be important. (GP 2)

Overweight in pregnancy as I said which increases birth weight and can affect the boys' weight later on. (Midwife 1)

Infant feeding

Following on from pregnancy, participants believed that differences in infant feeding behaviour may affect later child weight. Breastfeeding is known to reduce risk of child obesity and it was suggested that many ethnic minority groups were more likely to breastfeed, encouraging positive weight and eating patterns to develop.

I strongly believe that is a baby is exclusively breastfed for a minimum of 6 months then weaned by letting baby take the lead on healthy home-made foods children will grow with good eating patterns. (Health visitor 3)

Lots of breastfeeding and home cooked foods with all the family sitting down and eating which should be applauded in today's fast food society. (Health visitor 10)

Related to this was the way in which solid foods were introduced. Although mothers from ethnic minority groups were more likely to breastfeed, solid foods were often introduced at a younger stage, with food often being used for reasons other than hunger even at this early age. This was felt to impact upon weight development.

You can see it right from when the babies have solid foods which are often introduced far too young and the wrong type. (Health visitor 8)

Food choices and behaviours in the first year will be important. I do see weight creeping up by the first year and when questioned food plays a role in this. (GP 2)

Category two: Microsystem

Theme four: Parental body image ideals

Here, perceptions of ideal body image were believed to affect choices with diet and activity. These stemmed from the parents beliefs about their ideal weight for their child, or were modelled to the children through the parents own weight.

Parent child weight preferences

A sub theme raised by 15 (40.5%) of health professionals was that how parental perceptions of the child's ideal body weight were seen to differ between ethnic groups. One belief was that parents from Asian backgrounds perceived a larger body shape as a sign of health for their child and were generally less concerned about overweight.

Healthcare professionals mentioned how parents' perceptions and attitudes affect the child's weight. It's perceived that a large body weight has been shown as a positive sign by ethnic minority parents and was linked to being healthy. It was common between the parents to be less concerned about their child's weight status.

'I think there is a general acceptance of a larger body shape for children. Speaking to parents there is less concern for overweight. (School nurse 1)

Asian backgrounds I would think would be more based on the belief that a bigger child is a 'healthy' child or has more importance. (Health visitor 5)

Parental own body image

Related to this, participants believed that children's own body image may be affected by their family. Parents were believed to generally have a higher body weight, which in turn was modelled to the children.

Familial patterns, look to the mother and you will see the child. (GP 4)

The parents are also overweight- so as a role model why should the children be normal weight? (Practice nurse 2)

Theme five: Parenting approach (strict/control)

Another belief raised by 31 (83.8%) of the participants was that differences in wider parenting style affected diet and activity levels. This affected choices around meals and the way food was used alongside children's opportunities and freedom to play. Typically, parents from an Asian background were perceived as being far stricter than those from a White background.

Feeding style

Differences in parenting style were felt to affect the way parents interacted with their children in terms of what foods were eaten, when and how much. Beliefs around food intake were felt to affect child weight in particular. A common way in which this was felt to show itself was through a pressuring feeding style, where children were encouraged to eat more than they wanted. Finishing all the food on the plate for example was directly mentioned 20 times (54.1%) by health professionals.

Beliefs about feeding children (some cultures - Asian for example) feel that children must eat all the food or they will be hungry and do not allow the child to self-regulate. (Paediatrician 2)

There is a strong belief that finishing your food is a good thing and I think this is partly linked to child obedience. (HV 8)

Using food in non-nutritive ways was also raised. This included using food to soothe or food frequently being used in reward.

I think that there is an emphasis on food and that food and feeding are seen as good things and can be used to soothe or comfort or calm children and settle their behaviour. (Health visitor 1)

Parental attitudes to activity

Parenting style was also believed to affect activity, predominantly a more authoritarian, stricter parenting style amongst parents from Asian backgrounds. This had a number of pathways including beliefs about priority activities, freedom and safety.

One idea raised by 11 (29.7%) of the participants was that a focus on academic activity meant that as a consequence less priority was placed on physical activity. Asian parents set high expectations for their children to perform academically and encouraged regular study and tuition which naturally left less time for play and sports.

There is a lot of emphasis on good behaviour and good grades in school. There is less emphasis on sport and exercise. (Public health 1)

I think families place more emphasis on education and behaviour rather than diet and activity which of course are important elements too. (Paediatrician 1)

Expectations of behaviour from children also affected activity levels. Emphasis was placed on children being ‘well behaved’ and this was often based on quieter, more sedentary activities.

Children are encouraged to be well behaved but that often includes more sedentary activities. (Paediatrician 4)

Finally, practitioners raised the idea that children, particularly from Asian backgrounds had less independence than those from White backgrounds, which reduced activity level. Children were more likely to be driven to and from school and not to participate in after school sports clubs which reduced activity level.

I think they are also more likely to be driven to school and seem to take part in sports clubs at school less. (School nurse 12)

Theme six: Family influence

A further influence was the role extended family played in influencing decisions. Participants raised the idea that amongst Asian communities, older and extended family members were often involved in decisions involving children and their upbringing and this extended to beliefs about child diet, weight and activity.

Information from family members

Advice regarding both health and childcare was seen to be passed through generations and between families, with older family members often having considerable influence over parents. This familial knowledge and support was highly valued.

Support and information is also passed between families so beliefs are passed through and they might not often be the healthiest or what we would advise but we are not in charge so can only advise. (Health visitor1)

Advice and issues are taken from families rather than from professionals. A lot of information and advice is passed between generations and I think this can have both a good and bad effect. (Health visitor 2)

Ignore professional advice

Related to familial advice and support was the experience that those from ethnic minority groups were less likely to seek support or follow advice from health professionals.

I think these close families also mean that children are less independent and less affected by us as professionals. (Health visitor 2)

It's very hard to convince them it's unhealthy to be overweight- but from my experience they don't seem to take it seriously. (Practice nurse 3)

Family size

Finally, larger family size was raised. Asian families were believed more likely to come from larger families, which made ensuring a healthy diet and lots of activity more difficult. Mealtimes needed to be shared and there was less opportunity to take children to different activities.

I think this then all extends to wider family activities, children don't come and take part in activities or go to clubs, and they are more involved in the families. (HV 2)

The fact that many are from large families and it could be more manageable to keep children occupied by giving them sugary drinks/junk food which they enjoy and continue to ask for throughout their childhood. (Practice nurse 2)

Category three: Exosystem

Alongside biological and familial factors, wider social issues at the exosystem layer were raised.

Theme seven: Demographic factors

Both socioeconomic status and family size were noted as factors that may play a mediating role between overweight and ethnicity. Asian families were perceived to be at greater risk of overweight, but this was believed to occur as families were more likely to be larger and to live in poverty; two factors associated with overweight.

Poverty and income

Seventeen (45.9%) healthcare professionals raised the issue of poverty as a confounding variable between ethnicity and weight. Professionals believed it was poverty that led to poorer food choices that were higher in fat and energy rather than ethnicity itself.

But as I said above poverty is a factor as here where I work in a high poverty area, a lot of families come from poorer areas which we know has a negative impact on weight and diet. (School nurse 1)

I feel weight is linked to poverty and poor diets and often ethnic minorities are overrepresented among families living in poverty. (School nurse 3)

The association between these variables was emphasised as essential for any further research examining this area.

People are not just one thing though so you must look at things such as poverty or background. (School nurse 8)

In my experience children from Asian backgrounds are also more likely to come from poor families compared to White children. This will affect attitudes and things like what foods are cooked and how. (School nurse 11)

Category four: Macrosystem

Theme eight: Influence of culture

The role of wider culture, specifically around South Asian culture was believed to strongly affect dietary choices and ways of eating and sharing food. This was believed to place children at a higher risk of overweight, not just through food content, but the wider context in which it was eaten.

Cooking

One reason for the increased level of energy intake was the suggestion that traditional cooking methods and recipes had high levels of energy and fat. Traditional recipes were also passed through generations, which meant that ways of cooking were integral to families and that children learned these methods as part of their upbringing.

They get filled up a bit more if you know what I mean. More food and it's foods that are quite high in fat that they're being encouraged to eat. (HV 11)

Apart from that I do think there are certain cultural trends that affect things like what foods are eaten and how they are cooked and eaten. (School nurse 11)

Activity / celebrations

Related to this was the way in which celebrations were often tied to families coming together and eating traditional foods. Not participating was non negotiable and children were brought up to celebrate through these traditional recipes and to associate celebrations with cooking and family.

I think some of the Asian traditions of large family events and celebrations may cause a higher energy intake. (Paediatrician 1)

Not participating or not eating foods at these get together would not be acceptable and this fits with wider expectations on children and families that it is expected that you come together and eat regardless of preferences or even hunger. (GP 3)

Exploring differences in professional responses

Given that a wide variety of healthcare professionals completed the questionnaire, responses across professionals' categories were explored. In order to undertake this, professional categories were grouped according to the main professional clusters.

Three large groups were defined: School Nurses (n = 13), Health Visitors and a midwife (n = 13) and General Practitioners group is involving all health sectors such as GPs, paediatricians and practice nurses (n = 11). These groups naturally represented differing roles in terms of child age and public health versus medical care. Some professionals did not fit into these three main groups and due to low numbers, these were excluded from the remaining analyses (n = 11).

Firstly, the proportion of participants who identified each key theme was calculated (see Table four). Chi square was then used to explore whether different professional groups were more likely to identify specific themes. Chi square only revealed a significant association between group and theme for early influences, with no School nurse raising this area. However, looking at the proportion of responses, the non significant trend shows that health visitors are less likely to focus on diet and activity than other groups and more likely to focus on early influences. GPs focussed heavily on diet ad activity and parenting style, whereas School Nurses focussed again on diet and activity, but also parenting style and body image ideals. All focussed on psycho-social-cultural influences in some form.

Table 4: Rate of themes by professional group (chi square)

Layer	Theme	SN	HV	GP	x ²	P-Value
Individual	Diet / Exercise	76.9%	38.5%	72.7%	4.831	0.089
	Genetic	23.1%	30.8%	36.4%	0.514	0.773
	Early influences	0.0%	53.8%	18.2%	10.559	0.005*
Microsystem	Parenting style	61.5%	61.5%	90.9%	3.192	0.203
	Body image ideals	61.5%	23.1%	45.5%	3.949	0.139
	Family influence	23.1%	30.8%	27.3%	0.195	0.907
Exosystem	Demographics	46.2%	30.8%	36.4%	0.669	0.716
Macrosystem	Influence of culture	46.2%	38.5%	54.5%	0.621	0.733

* Significant at p < 0.05

The proportion of each professional group identifying each theme was then ranked (Table 5). This showed that agreement was generally found across the top three influences with all referring to dietary intake and exercise, parenting style and cultural influence within their top three ranked (or shared ranked) themes.

Table 5: Ranking of themes by professional group (1 is most common)

Layer	Reason	SN	HV	GP
Individual	Diet / Exercise	1	3	2
	Genetic	4	4	5
	Early influences	5	2	7
Microsystem	Family influence	4	4	6
	Body image ideals	2	5	4
	Parenting style	2	1	1
Exosystem	Demographics	3	4	5
Macrosystem	Influence of culture	3	3	3

To summarise, findings have shown diverse practitioners' views for increasing obesity prevalence in ethnic minority group. It is advocated that environmental factors rather than genetic factors have been the most important causes for increasing overweight and obesity. Distinctive characteristics were pointed by professionals to be linked into the increasing obesity level such as low physical activity, parenting feeding practice, and early introduction of solids.

3.4 Discussion

This study aimed to explore health and social care professionals' views of the findings of the NCMP report showing differences in risk of childhood overweight and obesity by ethnic group. In the report, Black and Asian children were at increased risk of overweight compared to White children, with children from Chinese backgrounds having the lowest risk (Department of Health, 2017a). Despite these findings reflecting other work in the area (Connelly, 2011; Cronberg, Wild,

Fitzpatrick & Jacobson, 2010; Harding, Teyhan, Maynard & Cruickshank, 2008), little work has explored the underlying factors contributing to these differences. The aim of this study was therefore to understand what those who worked with children and families perceived to be the contributing factors. These findings could then be used to develop further research to explore these influences.

The findings revealed eight key themes, which further split into eighteen sub-themes. These included diet and exercise, parenting style, demographics (poverty and income, family size), influence of culture, body image ideal, early influences, family influence and genetic. There were differences between professionals' groups in highlighting the reasons behind increasing obesity level in ethnic minority backgrounds.

Examining the influences raised by the professionals, a clear goodness of fit was seen from a theoretical perspective, in line with Ecological Systems Theory (Bronfenbrenner, 1977; 1986; Bronfenbrenner & Morris, 1998). Influences reflected the different levels of the model, including the individual, familial and societal levels. Individual factors included genetic or biological aspect, diet and exercise. Familial factors included parenting style, early influences, body image ideal and family influence, while, societal factors included influence of culture and demographics.

Individual / child characteristics

Individual child characteristics were considered. Genetics, or natural body composition, was a key theme raised. Genetics can play a key role in weight gain, both from predisposition to gain weight and from affecting factors such as food preferences and ability to regulate energy intake according to need (O'Rahilly & Farooqi, 2006). Limited research suggests that ethnic differences may occur in genetic susceptibility to weight gain, with African American and Hispanic populations are at more risk from a genetic perspective to obesity related diseases (Cossrow & Falkner, 2004). The FTO gene, which has been shown to increase risk of child overweight, is more prevalent among European and Asian groups and less common among the African population (Shinozaki & Okuda, 2012). However, research has not explicitly examined different ethnic populations in the UK.

A second theme was the belief that children from Asian families were more likely to consume more energy and take part in less activity, leading to weight gain. A limited number of studies have shown this pattern to be true in the UK. Children from ethnic minority families are more likely to have an unhealthy dietary pattern characterised with low consumptions of fruits and vegetables and higher dietary fat, and performed less physical activity (Cullen et al., 2003; Delva, Johnston, & O'Malley, 2007). Specifically examining children from Asian families, one study showed that compared to White Europeans, South Asian children consumed a much higher energy proportion and less fruits and vegetables (Donin et al., 2010). Similarly, Asian families were amongst the lowest ethnic groups who participate in activity, with girls from South Asian backgrounds having the lowest rate of physical activity in line with previous research performed both in the US and in the UK (Chen & Kennedy, 2004; Duncan, Woodfield, Al-Nakeeb, & Nevill, 2008; Maynard et al., 2009).

A further perceived factor was that of very early influences upon child weight. Health visitors in particular raised the idea that ethnic differences in factors such as weight during pregnancy and timing of introduction to solid foods might affect later child weight. Mothers particularly from Asian families were believed to be more overweight during pregnancy, to be less likely to exclusively breastfeed and to introduce solid foods too early. Increasing attention is being paid to how experiences during pregnancy and the first year can affect child weight and eating behaviour (Snethen, Hewitt & Goretzke, 2007). For example, maternal weight and eating behaviour in pregnancy can increase risk of child overweight (Brion et al., 2010; Johnson, Gerstein, Evans & Woodward-Lopez, 2006; Whitaker, 2004). Infants' weight at birth is associated with a later risk of obesity, with low and high birth weight being highly vulnerable to obesity (Bouchard, 2009). Formula feeding and an early introduction of solid also increase child risk of overweight (Bartok & Ventura, 2009; Brown & Lee, 2012; Daniels, Mallan, Fildes & Wilson, 2015).

Again, limited research has explored ethnic variations in these factors. Rates of first trimester obesity are higher among South Asian women compared to White women (Heslehurst et al., 2012). However, White women on average have heavier babies at birth compared to other ethnic groups, with South Asian (Indian and Bangladeshi)

babies weighing about 300g less than White babies (Leon & Moser, 2012; Kelly et al., 2009; Moser, Stanfield & Leon, 2008). Underweight is a risk factor for later obesity, fast catch up growth that occurred after 2 years of age increases later risk of obesity and non-communicable diseases (NCDs) (Adair et al., 2013). A recent study showed that despite being lighter, Pakistani infants have similar skin fold thickness and greater fat mass as assessed by cord leptin compared to White infants (West et al., 2013). Although Asian families typically have higher levels of breastfeeding than White mothers (Bolling, Grant, Hamlyn, & Thornton, 2007; Lawton, Ashley, Dawson, Waiblinger, & Conner, 2012), mothers from Asian backgrounds are more likely to introduce solid foods early, particularly traditional food mashed to babies with milk (Seach et al., 2010). These early experiences may all have a long term impact on the weight and eating behaviour of children.

Microsystem factors

A number of influences at the family level were raised. One core theme was the concept of maternal influences, in terms of her own weight and eating behaviour, diet and interactions and beliefs for her children. Research has shown that parents do play a key role in determining what their children eat, interactions during feeding and the activity that they engage in (Benton, 2004). For example, a child's diet and food preferences and dislikes correlate with parental preferences (Ventura & Birch, 2008). Parents who model healthy eating are more likely to have children who increase their intake and preference of nutrient dense foods (Hausner, Olsen, & Mølller, 2012). Ethnic variations in parental influences on child food preferences and intake have not been explored in the UK. However, a study with Hispanic children reported that higher fat dietary consumption by parents was associated with children's intake and preference for higher fat foods (Santiago-Torres, Adams, Carrel, LaRowe, & Schoeller, 2014).

Parental own activity patterns also directly affect and shape child activity behaviours (Braden et al., 2014; Gattineau & Mathrani, 2011a; Schreier & Chen, 2013). Parents who have positive attitudes towards physical activity are more likely to encourage and prioritise physical activity in their children, which in turn increases the activity levels of their child (Sleddens, Gerards, Thijs, de Vries, & Kremers, 2011). However, although research has shown that South Asian families are more likely to have lower

levels of activity (Chambers, Elliott, Scott, & Kooner, 2006; Sproston & Mindell, 2006), research has not explored how parental own beliefs and ideals about their activity levels specifically affect child diet and activity between ethnic groups in the UK.

Participants also felt that parents from South Asian backgrounds were also perceived to prefer a larger ideal body size for their child and to not recognise when they were overweight. Parent's misperception and identification of child weight status is directly linked to not recognise that their child is overweight (Hackie & Bowles, 2007). Childhood overweight has also been associated with parental preference of a larger body ideal (Hackie & Bowles, 2007). Parents who have a larger body image ideal for their child are more likely to have a child who is overweight, and vice versa (Farajian et al., 2013; O'Dea & Dibley, 2010).

In other countries, ethnic variation in body image perceptions and ideals has been shown. For example, in the USA, Mexican mothers have a larger body ideal for their child compared to White American mothers (Guendelman et al., 2010). Mexican mothers are also more likely to believe that a larger child is healthier (Rosas et al., 2010). Research in the USA has also shown that those from minority ethnic groups (Hispanic, West Indian and African American) are more likely to believe weight is genetically determined and difficult to change compared to White Americans (Goodell, Pierce, Bravo, & Ferris, 2008). Research has not, however, explored differences in body image by ethnic group in the UK.

Differences in child-feeding style were also identified with the suggestion that food was used more often in non-nutritional ways in South Asian families, such as through reward or for celebration. There was also the suggestion that mothers from Asian families were more pressurising in encouraging children to finish their meal. A large body of evidence has shown that mothers who pressurise a child to eat when they are not hungry, can exacerbate the risk of children consuming too much energy and losing the ability to regulate their own appetite, thus increasing risk of overweight. Alternatively, they can increase food refusal as the child dislikes the food even more under pressure (Benton, 2004). Using food for non-nutritive reasons such as reward can also encourage eating in the absence of hunger, rather than need.

Conversely, being restrictive with certain foods or times to eat can increase overeating when the child gets the opportunity (Ventura & Birch, 2008).

In the USA research has explored differences in maternal child-feeding style by ethnic group. Hispanic parents are found to use higher levels of using food for reward (Lindsay et al., 2011). African American parents are perceived to use uninvolved feeding practices towards their children, whereas Hispanic parents reporting more indulgent compared to other ethnic group (Hughes et al., 2005). Cardel et al. (2012) increasing child adiposity has been associated with parental restriction and pressure to eat, for ethnically diverse group as being found of low SES in USA study. However, pressuring children to eat even healthy foods has a vital counterproductive impact on child's eating behaviour as it impaired children's self-regulation of food intake (Mitchell, Farrow, Haycraft, & Meyer, 2013). However, research has not considered this variation in the UK, with particular criticism noted about how feeding style research is often limited to White British samples.

Participants also believed that differences in parenting style influenced child weight. In particular, they felt that parents from South Asian and Chinese families had a stricter parenting approach that may directly influence eating behaviour and therefore weight, but also opportunity for wider physical activity opportunities. Activities surrounding study and family were encouraged, whilst physical activity and freedom to play outside or to walk to school were lower. Research has shown that Asian and Chinese families are more likely to adopt authoritarian parenting styles, where rules are very strict compared to White families (Kao, 2004). Authoritarian parenting styles have been associated with feeding practices, with those adopting a stricter parenting approach using more controlling child-feeding practices, specifically restriction and pressure to eat (Hurley et al., 2008; Wisniewski & Chernausk, 2009). Permissive parents are also more likely to use food in non-nutritive ways, to shape and reward child behaviour (Patrick, Hennessy, McSpadden, & Oh, 2013). An authoritarian parenting style has been linked to a lower consumption of fruit and vegetables, as children start to refuse what they are being pressured to eat (Berge, 2009).

From a wider physical activity perspective, research has shown that parents from Chinese backgrounds place more pressure on children to spend time studying, and to participate in family activities (Chao, 2000). Asian children are also more likely to face higher encouragement and parental involvement to excel at school (Lee & Brown, 2006). However, research has not explored how parenting style related to ethnic background affects child weight in the UK.

Participants also raised the issue that parents from Asian backgrounds were more likely to be part of a close-knit extended family who influenced decisions around their child. In particular, grandparents' beliefs were felt to affect maternal choices, often offering different advice to that of the professionals. Ethnic minority populations are attached to family ecologies of connectedness where family members and grandparents have a direct engagement in child rearing compared to Whites (Kumanyika, 2008). Asian parents are more strongly connected to traditional values of the family in making useful choices for their children (Wehrly et al., 2014).

Limited research in the UK has shown that extended family members, particularly amongst Asian populations are more likely to have an influence on maternal feeding decisions. In particular, grandparents spend more time caring for the children, in turn affecting child diet and activity (Department of Health, 2008). Asian grandparents are also more likely to be involved in indulgent feeding of their grandchildren (Maynard et al., 2009). Finally, parents from ethnic minority backgrounds are less likely to take advice from health professionals, preferring the experience and knowledge of older family members (Kumanyika, 2008). However, research exploring the impact of this is limited in UK populations.

Exosystem factors

Wider social and cultural factors also determine the norms of behaviour locally and within cultures. Factors such as income, education, nutritious food accessibility, sport facility affordability, health literacy, neighbourhood environment, cultural norms of eating, physical activity and ideal weight perceptions are all factors that can affect child weight (O'Dea & Dibley, 2010). Where an individual lives can therefore affect how feasible and accessible it is to eat healthily and be active.

Poverty was strongly believed to affect child weight. A number of participants highlighted the finding that families from ethnic minority backgrounds were more likely to have a lower income and a larger family size. Poverty is known to affect child weight. Children from deprived families are more likely to eat a higher energy dense diet with lower levels of fresh food, vegetables and fruit (Gross, Velazco, Briggs, & Racine, 2013; Schreier & Chen, 2013). This can be attributed to high cost of food, lack of access to larger supermarkets, poorer home cooking facilities and a lack of skill (Ford & Dzewaltowski, 2008; Moore & Diez Roux, 2006). Family size is also connected to obesity rate, with obesity levels rising with number of family members (Çalışır & Karaçam, 2011; Khader et al., 2009). Family size can also make healthy eating and activity more challenging due to time and resource costs. Families can feel pressure to offer each child the same opportunity, meaning it is difficult to support all children (Kumanyika, 2008).

Children from deprived families are also less likely to participate less in physical activity (Delva, Johnston, & O'Malley, 2007). Barriers include a lack of time and resources, parents' perception of violence and neighbourhood safety (Schreier & Chen, 2013) and fear of racism or discrimination (Kumanyika, 2008). No research has explored this relationship by ethnic group in the UK however.

Ethnic minority families are more likely to live in poverty, which may affect food choices (Kumanyika & Grier, 2006). In turn, ethnic variations have been noted between weight, poverty and ethnic group for low income Hispanic groups (Shrewsbury, Wardle, 2008; Singh, Kogan, Van Dyck, & Siahpush, 2008), and low income Asian and Black ethnic groups in the UK (Cronberg, Wild, Fitzpatrick, & Jacobson, 2010). Ethnic minority families are also more likely to be larger than White families in the UK (Berthoud, 2000).

Macrosystem factors

Finally, practitioners expressed that wider cultural beliefs were also felt to affect child weight through cultural traditions and practices. Cultural traditions surrounding food were felt to encourage the intake of energy dense foods and for food to form a focal point of celebrations. These traditions were passed between generations. There is some evidence as to the influence of this on child diet. Families from Asian

backgrounds are more likely to regularly socialise together with relatives and friends to engage in feasts serving traditional foods (Department of Health, 2008; Maynard et al., 2009). Participation in family occasions, traditions and rituals often encourages eating in the absence of hunger and a lack of self-regulation (Mukherjea, Underwood, Stewart, Ivey, & Kanaya, 2013; Pieroni, Houlihan, Ansari, Hussain, & Aslam, 2007). Cultural beliefs and traditions have also been shown to affect the type of food eaten, and under what circumstances (Higgins & Dale, 2010).

Practitioners also believed that parents from ethnic minority backgrounds were less likely to allow their children to play outside in the neighbourhood due to fears or safety or perceiving it as inappropriate. There is little research, however, considering how these factors specifically influence childhood obesity from an ethnic minority comparison. Research has shown that parents from ethnic minority groups have greater concern for the safety of their children in the neighbourhood (Li, Dibley, Sibbritt, & Yan, 2006; McConley et al., 2011). This may be exacerbated by greater concerns surrounding racial discrimination, violence, and personal safety (Kumanyika, 2008). However, no study has specifically explored how these concerns may affect child activity level taking into account ethnic differences.

Limitations

This exploratory study did have limitations, particularly in terms of self selection of who chose to take part. Only those with a high interest in child weight and ethnicity may have taken part. However, given the aim of the study was to gain potential ideas for further research in the area, this was not a major concern. The method of sampling may have resulted in participation only from those who have email addresses and / or a work based computer. For example, in many hospital trusts, individual health staff such as nurses and midwives do not have work based email; it is reserved for more senior staff. However, snowball sampling through encouraging participants to share the questionnaire, and advertisement on social media reduced this limitation and a range of professionals took part. This approach also enabled responses from individuals across the UK, allowing responses from those in areas which are more ethnically diverse.

Finally, the measure used may have limited responses. An open ended questionnaire was best suited to the study aim as it enabled exploratory questions, for participants to complete it anonymously and in their own time (Bryman, 2008) and for the survey to be disseminated via email. However, it also meant that the researcher could not follow up responses with further questions, or encourage participants to give fuller responses. This did, however, mean that time pressure on participants was short, a factor likely that encouraged participation for busy health professionals.

Next steps

Overall the research offered an interesting professional insight into the many varied psycho-social-factors that experts working with families in child health believe may lead to ethnic differences in childhood obesity rates. These suggestions are important for those working to develop policy and practice in the field of child and ethnic minority health, but also serve as a call for the importance of further research into this important area.

In terms of the next steps to take, practitioners broadly identified a number of influences upon child weight that might differ between groups. As identified in the literature review, some of these such as genetic differences, diet and activity have been explored. However, a key influence that practitioners raised was that of maternal influences upon child weight. Elements such as body preference, feeding interactions and maternal own weight and eating behaviour are known to affect child weight, but little research has considered how these differ between ethnic groups in a UK context. Therefore, the next stage of this thesis will examine whether these aspects do show variation between ethnic groups in the UK.

Chapter 4

Do maternal perceptions of child weight, child feeding style and eating behaviour differ between ethnic groups?

4.1 Background

The aim of chapter three was to explore the reasons why health and social care professionals believe established differences in rates of child overweight and obesity in the UK between ethnic groups (DH, 2011; 2013; 2015; 2017a) might be occurring. Practitioners raised a number of ideas, including some already established as related in the literature such as differences in genetics (Nazroo, 1998), diet (Gatineau & Mathrani, 2011a) and activity (Owen et al., 2009a). Further ideas were discussed for influences that although are established contributors to childhood overweight and eating behaviour, a gap in the literature exists in understanding their variations between ethnic groups, particularly in a UK context.

Looking at scarce topics in the UK research, one of the main themes identified earlier was the concept of differences in maternal influences such as her perceptions of child weight, her feeding interactions and her own weight and eating behaviour. As noted in the literature review, this is a key area where

- a) Associations with child weight and eating behaviour are established (Carnell, Benson, Driggin, & Kolbe, 2014; Gregory et al., 2010; Jansen et al., 2014; Lewis & Worobey, 2011; Ventura & Birch, 2008)
- b) Research exploring differences in these factors between ethnic groups in the UK is sparse, despite a body of research in the USA highlighting variations between ethnic groups (e.g. Evans et al., 2011; Killion, Hughes, Wendt, Pease, & Nicklas, 2006; Pasch et al., 2016; Sherry et al., 2004; Trigwell, Watson, Murphy, Stratton, & Cable, 2013).

This lack of consideration of how ethnicity may affect maternal child perceptions, feeding style and own eating behaviour in a UK setting is therefore an important gap in the research, especially given established differences in risk of overweight

between ethnic groups in the UK. As noted previously, UK specific research is needed as research conducted in the United States has focused on African American and Mexican families (Hughes, Power, Fisher, Mueller, & Nicklas, 2005; Skala, et al., 2012; Ventura, Gromis & Lohse, 2010), whilst the largest non-White ethnic groups in the UK are Asian and Asian British. Additionally, demographic make-up is different; in the UK only 13% of the UK population is non-White compared to 29% in the USA (ONS, 2016; United States Census Bureau, 2010).

The aim of the current study was therefore to explore how maternal factors, including perceptions of child weight, child feeding style and own eating behaviour may differ between ethnic groups in the UK, with a focus on primary school aged children (aged 4 – 11). Given that ethnicity is a complex factor, further aims included understanding how demographic background (e.g. deprivation, education, duration of time in the UK, home language) affected these relationships.

The specific aims of this chapter in this study were therefore:

1. To understand whether differences in maternal perceptions and preferences for child weight, maternal child feeding style and maternal own eating behaviour differed between ethnic groups in the UK.
2. If differences for these behaviours emerge are these explained by other factors that are known to be associated with both child weight and ethnic group such as demographic background and parenting style?
3. If differences for these behaviours emerge are they stronger amongst those who are more closely tied to their ethnic group e.g. by speaking non English language at home, being born in another country, living in the UK for fewer years?

4.2 Methodology

Design

A quantitative approach was chosen for this study, utilising a self-administered closed item questionnaire consisting of a number of established, validated tools.

Quantitative methods are typically best for testing and confirming specific hypotheses, enabling the themes from study one to be systematically examined (Teddle & Tashakkori, 2003). There are four types of categories in quantitative research; descriptive, correlational, quasi-experimental and experimental (Creswell, 2009). A questionnaire was used to enable attitudes, beliefs and behaviours to be quantified and compared, utilising descriptive and correlational approaches (Christenson & Gutierrez, 2016). It also enabled established, reliable tools to be used, which allowed easier comparison with existing themes in the research.

Questionnaires are useful tools in gathering closed question data from large populations and allowing patterns in responses to be compared. A questionnaire was therefore useful in establishing whether the ideas posed in study one applied in larger populations (Saks & Allsop, 2012), particularly as it is an efficient, low cost solution for reaching large numbers of participants (Fife-Schaw, 2006).

A quantitative approach was therefore best suited to the aims of the study e.g. examining whether quantifiable correlates are present in maternal influences on child weight between ethnic groups. Building on suggested themes from study one and gaps identified in the literature review, it also allowed the relationships between variables to be examined and the influence of associated variables such as poverty, education and parenting style to be systematically controlled for (Buckingham & Saunders, 2004).

Participants

Mothers living in the UK with at least one primary school child aged 4 – 11 years completed a self-administered questionnaire. The initial invite went out to parents with primary responsibility of their child's diet. Only 32 fathers responded to the questionnaire; therefore, given potentially significant differences in influences on paternal feeding styles, the decision was made to exclude fathers from the analysis. Exclusion criteria included maternal inability to consent, maternal age younger than eighteen years, and significant child health issues that would impact on feeding interactions. Due to frequent criticisms that participant samples in the UK are often predominantly White Caucasian, purposive sampling was used to specifically attract participants from non-White backgrounds to the study (Barbour, 1999). Snowball

sampling was then used to encourage participants to share the questionnaire advert with peers and acquaintances (Penrod, Preston, Cain, & Starks, 2003). For further details please see the procedure.

Measures

Participants completed a self-reported questionnaire consisting of demographic background items, ethnicity data, and validated questionnaires measuring feeding and parenting styles. If participants had more than one child in the 4 - 11 age range, they were asked to focus on one child to complete their responses. The questionnaire consisted of six sections:

1. Demographic background

Participants reported their age, education, marital status, occupation and number of children. Given established relationships between ethnicity and poverty and education level (Kenway & Palmer, 2007; Stokes, Rolfe, & Hudson-Sharp, 2015), demographic data also examined household income, alongside neighbourhood health and deprivation data. This was measured by collecting the first three letters of UK postcode and extracting data from Postcode area database (ONS, 2011a). Data in reference to the percentage social grade A & B, deprivation index (0 – 100), percentage good health and percentage of White population (to indicate diversity) for each postcode area was extracted.

2. Ethnicity

Ethnicity data was collected via tick box using the ethnicity categories identified by the Office for National Statistics for Census data collection (Table 6). The UK census categorisations of ethnicity are commonly used in public health research (Aspinall, 2011). The latest UK census involves 18 categories, excluding Mixed groups, the researcher used the condensed list shown in table 6.

Table 6: ethnicity classification according to UK census 2011

UK Ethnic groups
<ul style="list-style-type: none">• White British• Gypsy/ Traveller/ Irish Traveller• Asian or Asian British: Indian• Asian or Asian British: Pakistani• Asian or Asian British: Bangladeshi• Asian or Asian British: Chinese• Asian or Asian British: Other• Black or Black British• Other

Participants were also asked whether they were born in the UK, and if not, how many years they had lived in the UK. They also identified what languages they typically spoke at home. A UK postcode was also used to measure neighbourhood-level data, including the diversity of the area in which the participants lived. The postcode area database was used to extract data reporting the % of the postcode area identified as White (ONS, 2011a). Generally, postcode database was also revealed proportion of ethnic group, South Asian, Black and Chinese and Other in the specific postcode area. Furthermore, information related to that specific area also had shown other relevant data including social grade and deprivation rate.

3. Maternal perceptions of child weight

To explore maternal perceptions and preferences for current child weight, participants completed a copy of the Children's Body Image Scale [CBIS] (Truby & Paxton, 2002). Participants were asked to select the silhouette that depicts their child current body size and the ideal body size of their child. This scale was developed in Australia, to measure individual's perceptions of, and satisfaction with, child body size in children aged 5 - 13 years old (Howe, Alexander, & Stevenson, 2017; Lampard, Byrne, Zubrick, & Davis, 2008). It includes separate scales for both male and female pictorial images from 1 (very thin) to 7 (obese). The CBIS has been shown to be reliable and valid in matching silhouette to weight. It has also had good test – retest reliability (Truby & Paxton, 2008).

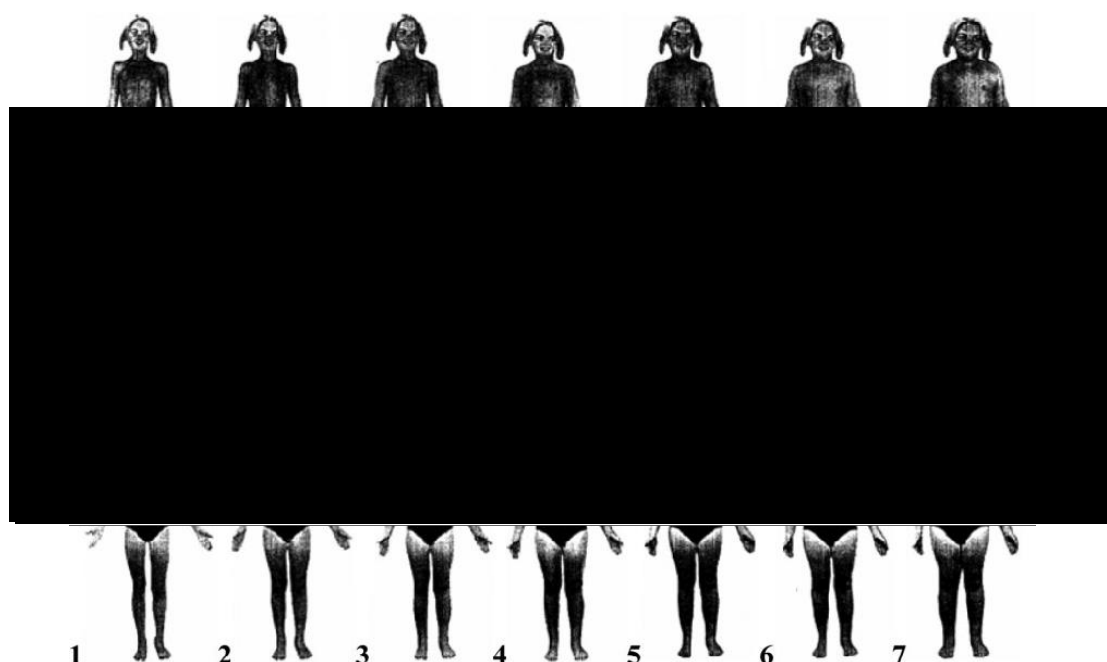


Figure Three: Truby & Paxton, 2002 (Children Body Image Scale)

To calculate weight groupings based on the silhouettes (e.g. under, normal and overweight), calculations are made according to the rules in Table seven and eight. Truby and Paxton (2002) caution that absolute BMI categories cannot be compared directly between boys and girls as “the thinnest figure for girls was thinner than that for boys in order to accommodate the normal sex variation in BMI distribution apparent in young children” (2002, p. 189). Therefore, different silhouettes represent different weight calculations based on gender.

Table 7: Girls silhouette weight categories adopted from (Truby & Paxton, 2002)

CBIS figure girls	UK 90 BMI percentiles	Weight group
Silhouette (1 – 2)	2 nd - 9 th	Underweight weight
Silhouette (3 – 4 – 5)	25 th – 50 th – 75 th	Normal weight
Silhouette 6	>85 th	Overweight
Silhouette 7	99.6 th	Obese

Table 8: Boys silhouette weight categories adopted from (Truby & Paxton, 2002)

CBIS figure boys	UK 90 BMI percentiles	Weight group
Silhouette (1 – 2)	2 nd – 10 th	Underweight weight
Silhouette (3 – 4)	25 th – 50 th	Normal weight
Silhouette 5	91 st	Overweight
Silhouette (6 – 7)	>98 th - >99.9 th	Obese

4. Maternal child feeding style

Participants completed six scales of the Child Feeding Questionnaire [CFQ] (Birch et al., 2001) including concern for child weight, monitoring, perceived responsibility, restriction and pressure to eat alongside perceptions of child weight. The CFQ has been validated and used widely in many research studies examining maternal child feeding style with a suggested child age range from 2 – 11 years (Birch et al., 2003). Participants also completed all four scales of the Parental Feeding Style Questionnaire [PFSQ] (Wardle, Guthrie, Sanderson, Rapoport, & Plomin, 2002) including control over feeding, emotional feeding, instrumental feeding, and encouragement to eat. The PFSQ was developed and validated in the United Kingdom, and had shown good internal consistency and excellent 2-week test-retest reliability (Wardle et al., 2002). A decision was made to use both tools as the different scales measure different feeding styles. A particular interest was to examine any differences between pressure to eat (CFQ) and emotional and indulgent feeding (PFSQ).

5. Maternal own eating behaviour

Participants also completed a copy of the revised Three Factor Eating Questionnaire [TFEQ-R18] to measure their own eating behaviour. This questionnaire measures cognitive and behavioural components of eating to give three subscales: dietary restraint (6 items), uncontrolled eating (9 items), and emotional eating (3 items) (Karlsson, Persson, Sjöström, & Sullivan, 2000), this version has good validity and predicts eating behaviour as well as the 51 item version (Stunkard & Messick, 1985).

Restraint measures the degree participants monitor and limit their food intake. Uncontrolled eating examines how often participants lose control over eating. Finally, emotional eating explores how often participants eat in response to their emotions e.g. happiness or anxiety.

The internal-consistency reliability coefficients of TFEQ (Cronbach's α) for each of the 3 subscales were above 0.70 and below 0.90 (Karlsson et al., 2000). The factor structure was also valid on normal weight students of the earlier TFEQ, not only obese subjects (Hyland, Irvine, Thacker, Dann, & Dennis, 1989). With respect to general population, TFEQ was tested for validity and reliability of the questionnaire (Bas & Donmez, 2008; De Lauzon et al., 2004). Theoretical ranges of each items were (6 – 24 for dietary restraint, 9 – 36 for controlled eating, and 3 – 12 for emotional eating). The reliability of the factors was assessed using Cronbach's α , dietary restraint was 0.79, 0.82 for controlled eating, and 0.89 for emotional eating.

6. Maternal parenting style

The Parenting Styles and Dimensions Questionnaire [PSDQ] (Robison, Mandlco, Frost Olsen, & Hart, 2001) measures parenting interactions and styles along three subscales; authoritative, authoritarian, permissive parenting style. Authoritative parenting is generally considered to have the most positive outcomes (Waters, 2017). Internal consistency and reliability of the PSDQ is high for both mothers and fathers (Robinson et al., 2001).

Procedure

Data collection was undertaken during a period of October 2015 to May 2016. The questionnaire was initially piloted for readability and acceptability of length on a small group of participants ($n = 10$). To ensure that the sample was diverse, data collection was multifaceted including online data collection, schools data collection, and through cultural and religious groups across the UK. An eight-month data collection period was used to ensure sufficient sample sizes in each target ethnic group. Both paper copies and an electronic version of the questionnaire hosted by Survey Monkey were available.

To recruit participants adverts were designed, describing the background to the study and a link for further information if the individual was interested in taking part. Details of how to contact the researcher were also available, if the individual wanted more information or to request a paper copy of the questionnaire. In all cases the study information highlighted the need for participants from diverse backgrounds, explaining how current research in the UK often focuses on primarily White groups and may therefore not be generalizable, and therefore helpful, for those from different ethnicities.

For the online data collection, digital adverts were placed on parenting forums (e.g. Mumsnet, Netmums, and Bounty). These websites have specific boards where research recruitment is allowed. Information about the study was posted with a link for further information if a participant was interested. Social media was also used to disseminate the study information link. This included posting on specific Facebook groups (after seeking permission from the board moderator). Groups were approached whose membership specifically focused on non-White groups and religions such as Islam, Hinduism and Sikhism. Participants were also encouraged to share the link to the questionnaire with others.

Schools were also approached to share information about the study with parents. Given the need for a diverse sample, schools in areas with greater diversity in the UK were approached including schools in Leeds, Bradford, Birmingham and London. Initial contact was made with the Headteacher of the school. If they wished to take part details of the study were shared either for the school newsletter or sent in a separate letter for parents. The information described the study aims, with a link to the online questionnaire or contact details to be sent a paper copy. Three schools in London requested paper copies of the questionnaire.

For respondents who completed the paper version of the questionnaire, an information sheet was included with consent questions and details on how to contact the researcher if further questions arose. A written debriefing at the end of the questionnaire explained the study's objectives, as well as where to seek further support if necessary. The researcher's contact details were provided if the participant required any further assistance.

Finally, local cultural community groups were approached to share information about the study including student groups, parenting groups, the local mosque and religious/cultural society groups. After seeking permission from group leaders, posters were placed in community venues giving links to the study and researcher, or information given for newsletters or email dissemination by the group.

For all adverts, participants if interested could click on a link that led to the online version of the questionnaire where participants could read study information and consent questions. The remainder of the questionnaire opened only if consent items were completed. At the end of the questionnaire, a debrief was loaded with information about the study and details of how to contact the researcher if required. As noted above, the majority of respondents chose to participate online.

Ethics

Ethical approval was given by Swansea University Research Ethics Committee and all participants gave informed consent before involving in the study research. All aspects of this study were performed in accordance with ethical standards set out in the 1964 Declaration of Helsinki. A participant information sheet fully explained the study with opportunity to ask the researcher questions. Consent items had to be completed in order for the questionnaire to load. Participants were informed of their right to withdraw at any time during the completion of the questionnaire and created a code name that they could use to withdraw their data if they wished, although they were given a data that this would be possible until (as data analysis would have begun). Finally, the online approach to data collection enhanced anonymity for participants as no traceable details such as IP address were collected.

Data analysis

Ethnic groups were classified according to UK census (ONS, 2011b) to split participants into four main ethnic groups: White British, South Asian (encompassing Indian, Bangladeshi, Pakistani), Black (Black African, Black Caribbean, and Black other) and Chinese. In order to compare the four main ethnicity categories used in the Child Measurement Programme, a small amount of Mixed (15) and other (8) were excluded from the analysis. Participant were also grouped as born in the UK

(Yes/No). Home language was classified into predominantly English/Welsh, Chinese dialects, and South Asian dialects.

The Child Feeding Questionnaire, Parental Feeding Styles Questionnaire and Parenting Styles and Dimensions Questionnaire were scored according to instructions into the scales described above. Maternal perceived and preferred child weight were grouped into under, normal and overweight according to the instructions given by Truby & Paxton (2002).

Data were then analysed using IBM SPSS statistics (version 22.0). Firstly, the association between maternal demographic background and ethnicity was examined using chi square, Pearson's r correlations and MANOVA to identify potential covariates in further analyses.

Chi square tests were used to examine associations between maternal preferred and perceived child weight and ethnicity. Regression analyses were additionally performed in order to allow exploration of how demographic factors may affect any significant associations between ethnicity and preferred and perceived weight. After checking for normal distribution of the CFQ, PFSQ, TFEQ-18 and PSDQ using the Kolmogorov-Smirnov Test, MANCOVA were then used to explore differences in maternal perceptions / preferences for child weight, maternal child feeding style and maternal eating behaviour between the four ethnic groups, controlling for significant covariates. The association between maternal demographic factors (age, education, income, occupation, time lived in the UK, language spoken at home, and neighbourhood background), parenting styles and these scales were examined using MANOVA, chi square and Spearman's correlations.

4.3 Results

Six hundred and fifty-nine full responses were included in the analysis. The mean age of respondents was 35.74 (SD: 6.17), with a range from 23 to 54 years old. Participants had between one and five children, with 39.5% (260) having one child and 56.2% ($n = 370$) two to three children. Further details of maternal background are shown below in Table 9:

Table 9: Maternal demographic characteristics

Demographic	Group	N	%
Education	GCSE or below	72	10.9
	A level	131	19.9
	Degree	227	34.4
	Vocational	90	13.7
	Postgrad	138	20.9
Marital status	Married	397	60.2
	Cohabiting	149	22.6
	Partner	39	5.9
	Single	74	11.3
Employment	Full time	321	48.8
	Part time	229	34.7
	None	109	16.5
Occupation	Higher professional/managerial	142	21.5
	Lower professional/managerial	189	28.7
	Skilled	133	20.2
	Routine occupations	74	11.2
	Unemployed / Stay at home mother	109	16.5
Income group	Less than £1000	27	4.1
	£1001-1700	76	11.5
	£1701-2700	156	23.7
	£2701-4200	202	30.7
	£4201	176	26.7
	Rather not say	22	3.3

Participant postcode was used to identify the area in which the participant lived, and to extract health and social factor data for that area. In terms of neighbourhood indicators, the mean and the range are shown below in Table 10.

Table 10: Distribution of neighbourhood health and social factors

Demographic	Mean	Range
% Social grade A & B	25.8	6.20 – 64.60
Deprivation score (0 – 100, 0 = low)	38.2	16.40 – 64
% Good Health	50.2	36.30 – 67
% White population	71.2	6.90 – 99.50

Selected child

The mean age of the child parents chose to focus on was 7.10 years (SD: 1.51) with a range from 5 – 11 years. Three hundred and ninety-eight children were male (60.4%) and 261 (n = 39.6%) were female. For birth order, 468 (71.0%) responded for their first-born child and 191 (30.0%) for a second born or more child. There was no significant difference in age [$F(3, 655) = 1.175, p = .318$], gender [$X^2 = 11.601, p = .071$] or birth order [$X^2 = 14.316, p = .112$] selected by ethnic group.

Ethnicity

A total of 390 participants (59.2%) identified as Caucasian White British or Irish, 145 (22.0%) as South Asian, 84 (12.7%) as Chinese and 40 (8.1%) as Black British, Caribbean or African. Within the South Asian category, 61 identified as Pakistani, 34 Indian and 50 Bangladeshi.

Five hundred and seventy two (86.8%) were born in the UK, with 87 (13.2%) born outside the UK. Of those not born in the UK, the mean duration of time living in the UK was 21.64 years (SD: 11.83) with a range from 2 – 50 years. Five hundred and ninety nine (92.0%) predominantly spoke English or Welsh at home, 15 (2.3%) spoke Chinese dialects at home and 37 (5.7%) spoke South Asian dialects at home. Other languages included Urdu, Hindi, Mandarin and others.

Question One: Is ethnicity associated with demographic and parenting factors that themselves might explain differences in childhood overweight?

Demographic factors

1. Number of children

For maternal background, the relationship between ethnic group and demographic background was explored finding a number of significant differences between ethnic groups. A significant difference in number of children was seen between ethnic groups [$F(3, 655) = 15.353, p < .001$]. Post hoc boneferroni tests showed that South Asian participants had significantly more children than White, Black and Chinese groups, whilst White participants had significantly more children than Chinese participants. White children had a mean number of 1.93 (SD: .83) children, South Asian 2.17 (SD: 1.0), Chinese 1.39 (SD: .69) and Black 1.70 (SD: .88).

2. Household income

Participants were also asked about their household income. Twenty-two participants preferred not to give income band but these individuals did not differ significantly by ethnic group. Chi square found a significant association between ethnic group and income group ($X^2 = 64.09, p < .001$). Chinese families were the least likely to have the lowest incomes, whilst Asian and Black families were less likely to have the highest incomes (Table 11).

Table 11: Income by ethnic group

	Income	Total sample		White		Asian		Chinese		Black	
		N	%	N	%	N	%	N	%	N	%
1	Less than 1000 a month	27	4.1	16	4.5	8	5.7	1	1.2	2	5.1
2	£1001 - £1700	87	13.2	31	8.7	24	17.0	15	18.5	17	43.6
3	£1701 - £2700	140	21.2	82	23.1	46	32.6	10	12.3	2	5.1
4	£2701 - £4200	206	31.3	128	36.1	32	22.7	31	38.3	15	38.5
5	£4201+	156	23.7	98	27.6	31	22	24	29.6	3	7.7
6	Prefer not to say	22	6.5	13	-	5	-	2	-	2	-

3. Neighbourhood characteristics

Neighbourhood factors were also examined between ethnic groups (Table 12). A MANOVA showed significant differences between ethnic groups for social grade [$F(3, 595) = 13.534, p < .001$], deprivation level [$F(3, 595) = 17.407, p < .001$], good health [$F(3, 595) = 7.983, p < .001$], and percentage White population [$F(3, 595) = 19.066, p < .001$]. White mothers lived in areas with lower levels of deprivation and higher percentage of social grade AB.

Table 12: Neighbourhood characteristics between ethnic groups

Ethnic Group	Mean % social grade AB	Range % social grade AB	Mean deprivation (0 = low)	Range deprivation	Mean good health	Range % good health	Mean % White population	Range % White population
White	24.0	6.5 – 64.6	31.4	18.4 – 64.1	49.9	39.8 – 67	75.8	6.9 – 99.5
SE Asian	21.6	6.2 – 64.6	39.2	16.4 – 63.2	49.4	39.9 – 67	58.9	6.9 – 99.3
Chinese	21.8	6.8 – 64.6	41.5	18.7 – 63.2	52.0	36.3 – 67	72.9	13.3 – 99.1
Black	22.3	12.9– 54.9	39.4	20.7– 59.2	51.2	44.2–65.4	69.2	10.1 – 99.1

4. Education

A significant association was also seen using chi square between ethnic group and level of education [$X^2 = 60.55, p < .001$]. Participants from White backgrounds were significantly more likely to have a higher educational level than all other ethnic groups. Those from Asian backgrounds were the most likely to have left education at GCSE level (see Table 13 below).

Table 13: Ethnic group and education

Education	White		Asian		Chinese		Black	
	N	%	N	%	N	%	N	%
GCSE	35	9.0	21	14.5	7	8.3	9	10.9
A level	66	16.9	25	17.2	22	26.2	18	45
Degree	138	35.4	52	35.9	30	35.7	7	17.5
Vocational	45	11.5	26	17.9	19	22.6	0	0
Postgraduate	106	27.2	21	14.5	6	7.1	6	15.0

5. Employment

A significant association was also found using chi square between ethnicity and whether the mother was employed [$X^2 = 84.05$, $p < .001$]. Black mothers were more likely than other groups to have full time employment while Asian mothers were more likely than other groups to have part time employment (see Table 14 below).

Table 14: Ethnic group and employment

Employment	White		Asian		Chinese		Black	
	N	%	N	%	N	%	N	%
Yes full time	219	56.2	66	45.5	26	31.0	28	70.0
Yes part time	142	36.4	57	39.3	22	26.2	9	22.5
No	28	7.2	22	15.2	36	42.9	3	7.5

A significant association was also found between occupation and ethnic group [$X^2 = 62.822$, $p < .001$]. White mothers were more likely to have higher and lower professional/managerial occupations compared to other groups while White were more likely to have skilled occupation. Chinese and South Asian mothers were more likely to be classified whether unemployed or stayed at home (Table 15).

Table 15: Ethnic group and occupation

Occupation	White		Asian		Chinese		Black	
	N	%	N	%	N	%	N	%
1 (Higher professional / managerial)	106	27.1	26	17.9	11	13.0	9	22.5
2 (Lower professional / managerial)	126	32.3	29	20.0	20	23.8	8	20.0
3 (Skilled)	88	22.6	39	26.8	8	9.5	10	25.0
4 (Routine)	42	10.8	29	20.0	9	10.7	10	25.0
5 (Unemployed/ stay at home mother)	28	7.1	22	15.2	36	42.9	3	7.5

6. Marital status

Finally, a significant association was found between marital status and ethnic group [$X^2 = 23.584$, $p < .023$]. White mothers were the least likely to be married, and more likely to be single compared to other groups (see Table 16).

Table 16: Ethnic group and marital status

Marital status	White		Asian		Chinese		Black	
	N	%	N	%	N	%	N	%
Married	214	54.9	95	65.5	62	73.8	26	65.0
Cohabiting	96	24.6	29	20.0	12	14.3	12	30.0
Partner	25	6.4	11	7.6	3	3.6	0	0
Single	49	12.6	8	5.5	7	8.3	1	2.5
Divorced	6	1.5	2	1.4	0	0	1	2.5
Widowed	0	0	0	0	0	0	0	0

7. Parenting style

Significant differences were found in parenting style between the ethnic groups for authoritative parenting [$F(3, 652) = 3.206$, $p < .023$], authoritarian parenting [$F(3, 652) = 10.873$, $p < .0001$] and permissive parenting [$F(3, 652) = 7.204$, $p < .0001$].

Table 17: Ethnic group and parenting style (mean score and standard deviation)

	White	South Asian	Chinese	Black
Authoritative	3.68 (.798)	3.60 (.583)	3.42 (.630)	3.71 (.484)
Authoritarian	1.93 (.958)	2.26 (.617)	2.38 (.576)	1.82 (.601)
Permissive	1.99 (.634)	2.19 (.798)	1.78 (.638)	2.17 (.728)

Post hoc Bonferroni tests found that for authoritative parenting, mothers from a White British background were significantly higher than those from a Chinese

background. For authoritarian parenting, mothers from Chinese and South Asian backgrounds were significantly higher than mothers from both White British and Black backgrounds. For permissive parenting, mothers from South Asian backgrounds were significantly higher than mothers from White British and Chinese backgrounds. No further differences were seen.

Summary

In short, a number of background factors differed between ethnic groups. These included neighbourhood factors, education, income, family size, occupation, employment and marital status. These background factors are associated with an increased risk of child weight. Therefore, further analyses will control for the influence of these factors.

Question two: Does perceived and preferred child weight differ between ethnic groups?

The second key question was whether perceived and preferred child size differed between ethnic groups, and if so, whether ethnicity was an independent predictor or whether associated demographic factors determined these differences.

Using the Child Body Image Scale, participants selected the silhouette which they felt most represented their child's body size. These were categorized as underweight, normal weight and overweight according to (Truby & Paxton, 2002) and are shown below in Table 18. No significant association was found between gender and weight category; therefore, the sample was treated as a whole.

Table 18: Parents' perceived and preferred child silhouette and weight category

	Silhouette	N	%
Perceived weight	Underweight	84	12.7
	Normal weight	491	74.5
	Overweight	84	12.7
Preferred weight	Underweight	105	15.9
	Normal weight	514	78.0
	Overweight	40	6.1

A significant association was found using partial correlation (controlling for significant income) between current perceived size and preferred size ($r = .172$, $p < .001$).

Does perceived and preferred weight differ by ethnicity?

Differences in perceived weight group were examined by ethnic group. As shown below in Table 19, a significant association was found using chi square between ethnic group and preferred size group [$X^2 = 30.496$, $p < .001$]. Chinese mothers were more likely to identify their child as an underweight silhouette, whilst South Asian and Black mothers were more likely to identify their child as an overweight

silhouette, albeit around three quarters of mothers desired a normal weight silhouette. The same pattern was seen for both boys and girls and therefore the sample treated as a whole.

Table 19 also shows the proportion of preferred weight categories by ethnic group. A significant association was found between ethnic group and preferred size group [$X^2 = 27.57$, $p < .001$]. Chinese mothers were more likely to desire an underweight silhouette, whilst Asian and Black mothers were more likely to desire an overweight silhouette, albeit the majority of mothers desired a normal weight silhouette. The same pattern was seen for girls and boys and therefore the sample treated as a whole.

Table 19: Perceived and preferred weight category of child by ethnic group

	Group	White		Asian		Chinese		Black	
		N	%	N	%	N	%	N	%
Perceived weight	Under weight	43	11.0	11	7.6	23	27.4	7	17.5
	Normal weight	298	76.4	108	74.5	59	70.2	26	65.0
	Over weight	49	12.6	26	17.9	2	2.4	7	17.5
Preferred weight	Under weight	59	15.1	16	11.0	26	31.0	4	10.0
	Normal weight	312	80.0	113	77.9	57	67.9	32	80.0
	Over weight	19	4.9	16	11.0	1	1.2	4	10

To explore whether associations between ethnic groups and perceived and preferred categories remained when demographic covariates were taken into consideration, two linear regression analyses were performed, using the enter method. To enable this for the nominal and ordinal data types, ethnicity was dummy coded into four separate variables, coding yes/no for White, South Asian, Chinese and Black ethnicity – an approach used in similar literature e.g. Lynch, Liu, Wei, Sping, Kiefe & Greenland (2009).

For perceived size the model explained .28 of the variance [$F(9, 646) = 16.329, p < .0001$]. South Asian and Chinese ethnicity, marital status (yes/no) and household income were significant predictors (Table 20)

Table 20: The unstandardised and standardised regression coefficients for variables associated with perceived size

Variable	B	SE B	β	Significance
South Asian ethnicity	.463	.109	.160	< .0001**
Chinese ethnicity	-1.188	1.36	-.332	< .0001**
Married (yes/no)	.116	.041	.101	< .005**
Household income	-.078	.039	-.073	< .046*

Pearson's r: * $p < 0.05$, ** $p < 0.001$; B = Unstandardised coefficient; SEB = Standard error of Unstandardised coefficient; β = Standardised Beta

For preferred size, the model explained .26 of the variance [$F(9, 646) = 13.289, p < .001$]. South Asian, Chinese and Black ethnicity, household income, and authoritarian parenting were significant predictors (Table 21).

Table 21: The unstandardised and standardised regression coefficients for variables associated with preferred size

Variable	B	SE B	β	Significance
South Asian ethnicity	.436	.082	.205	< .0001**
Chinese ethnicity	-.492	.101	-.186	< .0001**
Black ethnicity	.647	.139	.176	< .0001**
Household income	-.076	.029	-.097	< .009**

Pearson's r: * $p < 0.05$, ** $p < 0.001$; B = Unstandardised coefficient; SEB = Standard error of Unstandardised coefficient; β = Standardised Beta

Ethnic diversity of neighbourhood

No significant association was seen between whether mothers were born in the UK or not and perceived or preferred weight group. For those not born in the UK, A MANOVA comparing years lived in the UK between the three weight groups found that for preferred weight, a significant difference was found [$F(2, 649) = 4.292, p < .017$]. Mothers who preferred an overweight silhouette had lived in the UK for significantly fewer years (9.2) than those who preferred an underweight (19.86) or normal weight (23.38) years.

Chi square found a significant association between home language group and perceived weight group [$X^2 = 16.870, p < .002$]. Those who spoke Chinese dialects at home were more likely to choose an underweight silhouette, whilst those who spoke South Asian dialects an overweight silhouette compared to those who spoke predominantly English. No significant association was found for preferred size.

No significant difference was found using a MANOVA in the percentage of White population in the neighbourhood between perceived and preferred weight groups.

Summary

Ethnicity was significantly associated with maternal perceived and preferred weight. Mothers from South Asian and Black backgrounds were more likely to perceive and prefer a larger / overweight silhouette, whilst those from Chinese backgrounds were more likely to prefer a smaller underweight silhouette. Those who had a stronger connection to their ethnic group e.g. speaking another language at home, not being born in the UK, had the strongest associations.

This pattern remained even when demographic factors were controlled for, although income also remained a significant predictor for both, with those from a lower income perceiving and preferring a larger size.

Question three: Does maternal child-feeding style differ between ethnic groups?

Participants completed a copy of the child-feeding questionnaire that was scored as per instructions (Birch et al., 2001) to give five scales of perceived responsibility, restriction, monitoring, and concern for child weight and pressure to eat. Participants also completed a copy of the parental feeding style questionnaire that was scored as per instructions (Wardle et al., 2002) to give four factors of instrumental feeding, control, emotional feeding and encouragement.

Feeding style and ethnicity

Differences in maternal feeding style (measured by the CFQ and PFSQ) between ethnic groups were explored using firstly a MANOVA, and then secondly a MANCOVA adding in the demographic covariates identified in question one. The mean score and score, standard deviation, and differences between groups are shown below in Table 22. Post hoc Bonferroni tests found:

- Perceived responsibility: South Asian mothers were significantly lower in perceived responsibility compared to White British ($p < .001$) and Chinese ($p < .019$) mothers. Chinese mothers were significantly higher than White mothers ($p < .034$). Black mothers had no significant difference to any other group.
- Restriction: Chinese mothers were significantly higher in restriction than White British ($p < .003$) and South Asian ($p < .014$) mothers. Black mothers had no significant difference to any other group.
- Pressure to eat: South Asian ($p < .001$) and Chinese mothers were significantly higher in pressure to eat than White British ($p < .001$) mothers.
- Instrumental feeding: South Asian mothers were significantly higher in instrumental feeding compared to White British ($p < .001$) and Chinese ($p < .0001$) mothers.
- Emotional feeding: South Asian mothers were significantly higher in emotional feeding than White British ($p < .004$) and Chinese ($p < .0001$) mothers. Chinese mothers were also significantly lower than both the White British ($p < .0001$) and Black ($p < .001$) mothers.

Table 22: Mean score (and standard deviation) for each CFQ and PFSQ factor by ethnicity

		White British	South Asian	Chinese	Black	Significance without c
CFQ	Perceived responsibility	3.47 (1.03)	3.20 (.94)	3.65 (.75)	3.41 (.82)	F (3, 650) = 5.190, p <
	Concern for child weight	1.64 (.61)	1.67 (.53)	1.66 (.49)	1.74 (.40)	F (3, 650) = .461, p < .
	Monitoring	3.39 (.97)	3.24 (.95)	3.64 (2.31)	3.36 (1.65)	F (3, 650) = 1.788, p <
	Restriction	2.85 (.73)	2.83 (.60)	3.12 (.58)	3.01 (.71)	F (3, 650) = 4.496, p <
	Pressure to eat	2.63 (.88)	2.97 (1.12)	2.94 (.63)	2.75 (.61)	F (3, 650) = 5.575, p <
PFSQ	Instrumental	2.44 (.92)	2.81 (1.10)	2.31 (.98)	2.74 (1.11)	F (3, 650) = 7.491, p <
	Control	3.48 (.52)	3.63 (.66)	3.52 (.58)	3.50 (.52)	F (3, 650) = 2.414, p <
	Emotional	2.19 (.80)	2.45 (.87)	1.81 (.60)	2.38 (.78)	F (3, 650) = 13.404, p <
	Encouragement	3.73 (.60)	3.62 (.60)	3.62 (.74)	3.68 (.59)	F (3, 650) = 1.197, p <

Significant differences at $p < 0.05$ are shaded.

Next, the relationship between feeding style and time lived in the UK, home language and ethnic diversity of neighbourhood was then explored

Time lived in UK

T tests were used to explore differences in child-feeding style between those born in the UK or not. A significant difference was found for restriction [$t(652) = -2.057, p < .040$], pressure to eat [$t(652) = -2.522, p < .012$], and instrumental feeding [$t(653) = -2.01, p < .045$]. Both pressure to eat and restriction were higher amongst those not born in the UK, whilst instrumental feeding was higher amongst those not born in the UK. For those not born in the UK, Pearson r correlations were used to explore the association between length of time lived in the UK and child feeding style. A significant negative correlation was found between time lived in the UK and pressure to eat ($r = -.281, p < .006$) and restriction ($r = -.068, p < .042$). The longer an individual had lived in the UK, the lower their use of both. No further significant associations were found.

Home language

A multivariate ANOVA was used to explore the difference in child feeding style between those who spoke predominantly English alone at home, a Chinese dialect, or a South Asian dialect. A significant difference was found between language group for instrumental feeding [$F(2, 644) = 4.190, p < .016$] and emotional feeding [$F(2, 644) = 6.652, p < .001$]. Post hoc bonferroni tests showed that for instrumental feeding those who spoke a South Asian dialect at home were significantly higher than those who spoke English alone ($p < .006$). For emotional, those who spoke South Asian dialects at home had higher scores than those who spoke English ($p < .009$) or Chinese dialects ($p < .003$).

Neighbourhood diversity

No significant associations were found between maternal child feeding style and the percentage of neighbourhood population that was White.

Summary

Significant differences in child feeding style are seen between ethnic groups in the UK. In particular two core patterns were seen:

1. Chinese mothers are higher in perceived responsibility, restriction, pressure to eat and lower in instrumental and emotional feeding.
2. South Asian mothers are lower in perceived responsibility and restriction, whilst higher in pressure to eat, instrumental feeding and emotional feeding.

Child feeding behaviours are related to cultural factors. Mothers who speak a non English dialect at home show higher use of emotional and instrumental feeding. In addition, the lower the duration of living in the UK, or for mothers who were not born in the UK, the higher the use of restriction and pressure to eat.

Demographic factors (e.g. income, education, marital status, parenting style, are associated with both ethnicity and maternal perceptions and behaviours. However, when these are considered in the analyses, ethnic group remains a significant predictor of differences in maternal perceptions and behaviour.

Question Four: Does maternal eating behaviour differ between ethnic groups?

Finally, to examine whether differences in maternal eating behaviour could be identified between ethnic groups, participants completed a copy of the three-factor eating questionnaire which was scored to give the factors of cognitive restraint, uncontrolled eating and emotional eating.

Differences in maternal eating behaviour between ethnic groups

A MANCOVA was then used to examine differences in each of the three eating behaviour factors between ethnic groups, controlling for demographic factors associated with ethnicity. The findings are shown below in Table 23.

Table 23: Mean score (and standard deviation) for each TFEQ factor by ethnicity

	White British	South Asian	Chinese	Black	Significance without covariates	Significance with covariates
Cognitive restraint	2.48 (.44)	2.31 (.65)	2.49 (.46)	2.24 (.45)	F (3, 655) = 6.381, p < .001	F (3, 595) = 5.068, p < .002
Uncontrolled eating	2.69 (.63)	2.67 (.66)	2.30 (.74)	2.72 (.69)	F (3, 655) = 6.322, p < .001	F (3, 595) = 4.578, p < .004
Emotional eating	2.46 (.76)	2.64 (.85)	2.16 (.81)	2.67 (.64)	F (3, 655) = 6.836, p < .001	F (3, 595) = 6.714, p < .001

Significant differences between ethnic groups were found for all three eating behaviour factors. Post hoc bonferroni tests showed that for cognitive restraint, Chinese mothers were significantly higher in restraint than both South Asian (p < .010) and Black (p < .022) mothers. White British mothers were significantly higher than south Asian (p < .007) and Black (p < .045) mothers. No further significant differences were found.

For uncontrolled eating, Chinese mothers were significantly lower in uncontrolled eating than the White British (p < .0001), South Asian (p < .003) and Black (p < .020) mothers. No further significant differences were found.

For emotional eating, the Chinese group were significantly lower in emotional eating than the White British ($p < .013$), South Asian ($p < .0001$) and Black ($p < .004$) mothers. White mothers were significantly lower than both South Asian ($p < .043$) and Black mothers ($p < .041$).

Time lived in the UK

T tests were used to explore the difference in maternal eating behaviour between those born in the UK or not. No significant differences were found for any eating behaviour factor.

For those not born in the UK, partial correlations were used to explore the association between the length of time lived in the UK and maternal eating behaviour. Significant positive correlations were found between time lived in the UK and uncontrolled eating ($r = .296$, $p < .001$) and emotional eating ($r = .242$, $p < .015$). The longer an individual lived in the UK, the higher their uncontrolled and emotional eating. No further significant associations were found.

Home language

A multivariate ANOVA was used to explore the difference in maternal eating style between language groups. No significant differences were found.

Neighbourhood diversity

No significant associations were found between maternal eating behaviour and the percentage of neighbourhood population that was white.

Summarising the findings

In summary, a pattern emerged in the data. Mothers from South Asian backgrounds generally had preferences for a larger size for their child, were more likely to use higher levels of pressure to eat, emotional and indulgent feeding, and to be higher in emotional and uncontrolled eating themselves. Conversely, Chinese mothers showed the opposite pattern; preferring a lower child body size, using higher levels of restrictive feeding, and being higher in restrained eating themselves. White British mothers typically fell in the middle of these two groups, with Black mothers following the patterns of South Asian mothers for weight perceptions/preferences and own eating behaviour and showing more similarity to White British mothers for child-feeding style. At no point did Black mothers have significantly higher feeding practices or eating styles than other groups, despite also having a preference for a larger child.

Demographic factors were also associated with these perceptions and behaviours, however when controlled for, ethnicity remained a significant predictor.

4.4 Discussion

The aim of this study was to explore how established maternal influences upon child weight might differ between ethnic groups in the UK, in order to start to understand ethnicity differences in rates of childhood overweight and obesity. Although research has examined how differences in weight related factors such as genetics (Nazroo, 1998; Wulan, Westerterp, & Plasqui, 2010), diet (Gatineau & Mathrani, 2011a) and activity levels (Owen et al., 2009a) can differ between ethnic groups, variations in psychosocial predictors of childhood obesity such as maternal perceptions, attitudes and behaviours that have all been shown to be established predictors of child weight (Bergmeier et al., 2017; Robinson & Sutin, 2017; Rodgers et al., 2013b), remain largely unexplored between ethnic groups in the UK. The study sought to start to unpick how these behaviours might differ between ethnic groups and understand whether any differences were directly associated with ethnicity, or in fact variations in wider demographic and background factors.

Three key areas of maternal beliefs and behaviours were examined: maternal perceptions and preferences for child weight, maternal child feeding style and maternal own eating behaviour. Significant differences between ethnic groups were found for elements of all of these three areas, which were also related to factors such as time spent in the UK and language spoken at home. Although differences in demographic background and parenting style were identified between the different ethnic groups, these did not explain differences in maternal outcome measures. The key differences and their impact are discussed below.

Maternal perceptions of child weight

Both maternal perceived child size and preferred child size differed between ethnic groups. Overall mothers from South Asian and Black backgrounds were significantly more likely to perceive or prefer an overweight silhouette, whilst mothers from Chinese backgrounds were more likely to perceive and prefer an underweight silhouette. Mothers from White British backgrounds generally selected a silhouette in the middle of these groups.

However, notably just 12.7% of the sample as a whole perceived their child to be overweight or obese which is much lower than the UK average measured in the National Child Measurement Programme. Latest figures show 22% of 5 year olds and 34% of 11 year olds are overweight or obese (DH, 2017a). This difference may be due to lower levels of overweight in the sample who chose to take part, or may be due to a tendency for parents of overweight children not to recognise their child is overweight, or downplay their weight when asked in research (Maynard, Galuska, Blanck, & Serdula, 2003).

Considering how these findings fit with existing evidence, research examining differences in ethnic groups in the UK is very limited. One study found that mothers from Black African, Black Somali and South Asian Bangladeshi and Yemeni backgrounds living in the UK were more likely to perceive and prefer a ‘chubby, ‘fat’ or ‘full bodied’ child in comparison to Chinese and White British groups (Trigwell, Watson, Murphy, Stratton, & Cable, 2013). Another study exploring cultural preferences into body size found that Bangladeshi adults living in the UK

perceived a larger body size as healthier and desirable; however, this was not limited to children (Greenhalgh, Helman, & Chowdhury, 1998).

Looking outside of the UK, research examining differences between ethnic groups in the USA has shown that Hispanic and African American mothers are more likely to prefer a larger body size for their child, whilst also being less likely to perceive this as overweight (Chaparro, Langellier, Kim, & Whaley, 2011; Killion, Hughes, Wendt, Pease, & Nicklas, 2006; West et al., 2008). This is strongly tied into cultural norms and preferences. In one study with Latino parents, a larger body size was preferred for children, as a higher body weight was perceived to be healthier and a sign of good mothering (Lindsay et al., 2011).

Research exploring Chinese maternal perceptions of child weight is sparse, perhaps traditionally because levels of obesity in China have been low, although are rapidly rising (Yu, Han, Chu, Xu, Zhu & Guo, 2012). Two studies however have shown that similar to other groups, when children are overweight, Chinese mothers are less likely to perceive them as so (Wen & Hui, 2011; Yao & Hillemeier, 2012). However, in both studies the rate of overweight and obesity was far lower than in research in Western countries.

Although similar research from outside the UK is of interest, direct comparisons cannot and should not be made between ‘white’ and ‘all other’ ethnic groups for a number of reasons (Bhopal, 2004). Firstly, ethnic diversity follows a different pattern in the USA compared to the UK. In the USA, 29% of the populations are non-White compared to 13% in the UK. In the USA the largest non-White groups are African American and Mexican whilst in the UK the largest groups are Asian or Asian British (ONS, 2016; United States Census Bureau, 2010). Also, predominantly (but not exclusively) Black American families are of African origin, whilst Black British families are of Caribbean origin (Aspinall, 2002).

However, there are a number of parallels between Black and South Asian groups in the UK and Hispanic, Latino, and African American groups in the USA (where research has predominated). Notably, all groups in both the UK and the USA have on average higher poverty and lower education levels (Cook, Tseng, Tam, John & Lui,

2017; Hasson, Hsu, Davis, Goran, & Spruijt-Metz, 2017; Power et al., 2017). Poverty and lower education in turn have been associated with higher maternal preferences and perceptions for child weight (Ventura & Birch, 2008).

Previous research has shown how household income and other indicators of deprivation are associated with maternal perceptions and preferences for child weight. Parents of low income communities have been shown to prefer a larger child, perceiving their children as naturally ‘solid’ or ‘thick’, with less concern about weight as long as the child is active and happy (Jain, Sherman, Chamberlin, Carter, Power, & Whitaker, 2001). Parents from lower income groups are also less likely to realise their child is overweight, perceiving a larger size as healthier (Goodman, Hinden, & Khandelwal, 2000).

Finally, poverty and ethnicity can interact. In the ABCD (Amsterdam Born Child and Development) study, ethnic differences in maternal perception of child weight were found between Dutch, African, Moroccan and Turkish families. Specifically, although those from Moroccan and Turkish backgrounds were less likely to recognise their child as overweight, this was largely explained by differences in education and income (De Hoog, Stronks, van Eijdsen, Gemke, & Vrijkotte, 2012).

However although those from South Asian and Black background did have a lower income and education level compared to White and Chinese groups, when maternal demographic background was controlled for, significant differences in perceptions and preferences for child weight remained.

Maternal child feeding style

A number of differences emerged between maternal child feeding style between the different ethnic groups. Particular differences were found for perceived responsibility, restriction, pressure to eat, instrumental feeding and emotional feeding. A pattern was seen – pressurising feeding approaches such as pressure to eat, instrumental feeding and emotional feeding were highest amongst South Asian mothers, whilst restrictive practices – restriction and perceived responsibility – were highest amongst Chinese mothers. Both White and Black mothers generally fell in the middle range. Notably, Chinese mothers were also high in pressure to eat, but not

emotional or indulgent feeding, and combined with restrictive practices suggests an overall high level of control rather than using food for non-nutritive reasons.

Research examining differences in maternal child feeding style between ethnic groups in the UK is extremely sparse. In one recent study conducted in the UK preschool children, mothers from Black African-Caribbean and South Asian backgrounds were higher in pressurising, emotional feeding and instrumental feeding compared to White British mothers (Gu, Warkentin, Mais, & Carnell, 2017). In another study, mothers from Pakistani backgrounds in Bradford were more likely to use authoritarian parenting styles with their toddlers compared to White mothers. This parenting style is characterised as being high in demandingness and low in responsiveness suggesting a pressurising feeding approach (Fairley et al., 2015).

Comparatively in the USA, the topic is better explored, showing variation in maternal child feeding style between ethnic groups. For example, African American mothers (Spruijt-Metz et al., 2002; Spruijt-Metz et al., 2006) and Mexican mothers (Matheson, Robinson, Varady, & Killen, 2006) have both been shown to use higher levels of pressure to eat compared to White American mothers. However, other research has shown that Black African-Caribbean mothers were more likely to be higher in restriction than White German or White British groups (Blissett & Bennett, 2013). Meanwhile, Chinese parents have also shown in previous studies to be higher in restrictive feeding practices (Huang et al., 2012; Pai & Contento, 2014). Research exploring why Chinese parents are more likely to use restrictive practices has suggested that Chinese mothers view restrictive practices as a ‘duty response’ to preventing children from adopting unhealthy American eating habits (Wehrly et al., 2014).

Eventually, in terms of emotional / indulgent feeding styles, there appears to be very little research that has considered whether variations occur in this approach between ethnic groups. In one study in the USA, Hispanic and Black mothers were more likely to report using food to calm or shape a child’s behaviour compared to White American mothers (Evans et al., 2011). Notably, in this sample, although maternal preferences and perceptions of child weight were similar between South Asian and Black mothers (and also similar for eating behaviours), these groups generally

showed differences for maternal child feeding style. Whereas South Asian mothers were often significantly higher or lower in a behaviour, no significant pattern was found for Black mothers, with responses generally being more similar to White British mothers. This may be because of genetic differences in weight e.g. Black children may be a higher weight, but not necessarily fat, therefore feeding styles might not be playing a role.

Mothers who have lived in the UK for a longer period reported lower levels of pressure to eat, suggesting that the longer mothers have been in the UK, their use of pressurising child feeding practices reduces. Although there is a dearth of research in the UK on the impact of acculturation on maternal child feeding style, research from the USA shows that the higher the degree of acculturation, the lower the use of pressure to eat healthy foods amongst Chinese groups (Pai & Contento, 2014). It has been suggested that amongst groups who have lived a shorter period in the dominant culture, holding on to cultural values from the home country is a way of continuing to feel attached. In one study in the USA with parents from Indian American backgrounds, those with lower acculturation used more pressure to eat, citing cultural norms in their home country as a reason for their behaviour (Momin, Chung & Olson, 2014). With regard to acculturation level, less acculturated Spanish-speaking Hispanic parents were found to be more likely to pressurise their child to eat more in comparison to English-speaking Hispanic parents (Evans et al., 2011).

As above, wider factors may play a role. Deprivation (which ties to ethnic group) is also associated with maternal child feeding style. In a Dutch sample, using emotional feeding approaches such as instrumental and emotional feeding was associated with low and high SES compared to intermediate SES (Raaijmakers et al., 2014). Potentially lower income families are using food as a low-cost reward or bribery tool. Families living in deprivation have also been identified as pressurising children to clear their plates at mealtimes, driven by a lack of food availability outside of meals (Richards & Smith, 2007). However, in the current study, significant differences in child feeding style remained when maternal demographic background was controlled for.

Parenting style was also included as a covariate due to established associations between parenting style and ethnicity and parenting style and child feeding style. The findings here reflected previous research. Chinese mothers were typically higher in authoritarian parenting practices whilst South Asian mothers were higher in both authoritarian and permissive feeding styles (Ali & Frederickson, 2011; Ang & Goh, 2006; Raj & Raval, 2013). Meanwhile, authoritarian parenting approaches were associated with more controlling feeding practices (e.g. Blissett & Haycraft, 2008; Hughes, Power, Connor, Fisher & Chen, 2016). However, again, differences between ethnic groups remained when parenting style was included as a covariate.

It is possible that differences in feeding style between ethnic groups are part of an overall difference in parenting style. Coupled with previous findings, although both Chinese and South Asian mothers may be high in authoritarian parenting, control may present itself in different ways. Chinese mothers wish to restrict, whilst South Asian wish to pressurise, in line with body image ideals. Additionally, South Asian parents, in line with their instrumental and emotional feeding styles may be more permissive in their approach to food.

Maternal own eating behaviour

Ultimately, maternal own eating behaviour was examined, finding differences between ethnic groups. Overall, Chinese mothers were considerably higher in restraint than South Asian and Black mothers whilst for both emotional and uncontrolled eating behaviours Chinese mothers were significantly lower than White, South Asian and Black mothers. South Asian and Black mothers also had significantly higher levels of emotional eating compared to White mothers.

Research examining differences in maternal eating behaviour between ethnic groups is sparse. However, more broadly, eating behaviour and body image are closely tied. Cognitive restraint is typically a response to body dissatisfaction and wishing to lose weight (Johnson & Wardle, 2005). Lower cognitive restraint therefore suggests lower body dissatisfaction, or satisfaction with a larger silhouette. Although uncontrolled and emotional eating may initially appear to be the opposite of restraint, often the two fit together. Restraint can lead to over eating, which in turn can lead to restraint, and the cycle continues (Woods, Racine, & Klump, 2010). Although

emotional eating is tied to body weight (typically due to an excess intake of calories), emotional eating is typically driven by external events. Emotional reactions, often negative but including positive, can lead to eating in the absences of hunger (Macht, 2008) and therefore overweight (Snoek et al., 2007).

The relationship between ethnicity and restraint therefore needs to be considered in relation to body image. Restraint is typically related to desire for a smaller silhouette and lower weight and therefore preferred body size. Research in the USA, shows that South Asian women have lower levels of body dissatisfaction than White women (Cachelin, Rebeck, Chung, & Pelayo, 2002). Similarly, African American and Asian American college students have more positive body image than White American and Hispanic American students (Wardle & Marsland, 1990). In children, White British girls are more concerned about their weight than Black British or South Asian girls (Wardle & Marsland, 1990). Similarly, Muslim – Asian British children have been shown to have greater body satisfaction than White British children (Ahmad, Waller & Verduy, 1994). However, there appears to be a dearth of research examining body image and eating behaviour amongst Chinese groups in the UK or USA.

Meanwhile, South Asian and Black mothers had higher levels of emotional eating. To understand this relationship, it is important to consider the drivers of emotional eating behaviours. Humans eat for a variety of reasons, and one of these is to soothe or block out our emotions (Ogden, 2011). Emotional eating is also a response to stress (Zellner et al., 2006) and depression (van Strien, Konttinen, Homberg, Engels & Winkens, 2016). South Asian and Black mothers are at a higher risk of depression compared to White British mothers, particularly if they are immigrants to the UK (Nilaweera, Doran, & Fisher, 2014). Emotional eating can also be a reaction to events such as financial difficulties, as a coping mechanism (Koupil et al., 2016; Reagan & Hersch, 2005) and mothers from South Asian and Black backgrounds in the UK are more likely to have a lower income (Garner & Bhattacharyya, 2011; Platt, 2007).

Maternal eating behaviour was also associated with how long a mother had lived in the UK. Interestingly, the longer a mother had lived in the UK, the higher their uncontrolled and emotional eating behaviour. Potentially South Asian mothers – who

were the highest in uncontrolled and emotional eating - start to adapt to higher levels of restraint present in the UK, linked to higher levels of body image dissatisfaction amongst White British women. In Australia, the longer female immigrants lived in Australia, the more their eating behaviour matched typical Western values of dieting and dissatisfaction (Ball & Kenardy, 2006).

What are the implications of the findings?

Maternal perceptions, attitudes and behaviours that are related to child weight and eating behaviour therefore differed between ethnic groups. Given established associations between maternal factors and child weight (Ventura & Birch, 2008), these differences may therefore potentially be contributing towards differences in child weight between ethnic groups seen in the National Child Measurement Programme data.

Firstly, maternal preferences for a larger size for their child have been associated with child overweight (Ceballos & Czyzewska, 2010; Sosa, Mckyer, Goodson, & Castillo, 2014). Preference for a larger size is in part linked to not realising a larger size is overweight (Jeffery, Voss, Metcalf, Alba, & Wilkin, 2005). If children appear fit and active, parents may not realise it presents a health issue (Brødsgaard, Wagner, Peitersen, Poulsen, & Sørensen, 2011). Others may prefer a larger size, increasing the amount they offer their child due to a belief that the child needs to put on weight (Benton, 2004; Scaglioni, Arrizza, Vacchi & Tedeschi, 2011). As the current research showed, mothers who preferred a larger body size in their child were more likely to encourage the child to eat more. A higher use of pressure to eat and emotional and instrumental feeding practices amongst South Asian groups may therefore arise from a desire for their child to be a larger size.

Secondly, a large and growing body of literature suggests that maternal child feeding style and child weight and eating behaviour are linked, although not all cases are conclusive (Ventura & Birch, 2008). Mothers who use higher restriction and monitoring are more likely to have a child who is overweight (Black & Selcuk, 2011; Monnery-Patris et al., 2011) whereas mothers who use high levels of pressure to eat are more likely to have a child who is underweight (Jansen et al., 2017; Shloim, Edelson, Martin, & Hetherington, 2015; Yavuz & Selcuk, 2018). This relationship

has been shown to be bidirectional; although mothers may react to their child's weight, high levels of control can affect child weight over time (Faith et al., 2004; Farrow & Blissett, 2008).

Restricting a child's intake – usually of palatable food or amount – has been linked to overweight, because it increases preferences for that food. Children who are heavily restricted are more likely to over eat in the absence of hunger (Rollins, Loken, Savage & Birch, 2013). On the other hand, pressurising a child to eat more can lead to picky eating and a lower intake of food as the child further avoids eating the target food (Brann & Skinner, 2005). However, pressurising a child to eat more or overeat, can sometimes lead to overweight, as the child learns to respond to external cues to eat rather than internal cues for hunger (Harris, Mallan, Nambiar & Daniels, 2014).

Eventually emotional or instrumental feeding can lead to child overeating (Jansen et al., 2018), even in the absence of hunger (Blissett, Haycraft & Farrow, 2010), and therefore overweight (Chan, Magarey & Daniels, 2010). Emotional feeding not only encourages the child to overeat for non-nutritional reasons and in the absence of hunger, but also teaches them to respond to emotions by eating. It potentially sets the child up to respond to difficulties, celebrations or simply boredom by using food in later life (Rodgers et al., 2013a).

Taken together, these findings may in part explain why children from South Asian backgrounds are more likely to be overweight. If mothers are using high levels of pressure to eat, instrumental and emotional feeding, their children may be taking in an excess of calories for reasons other than hunger. Food may be used for reward, bribery or for emotional reasons rather than for nutrition. Pressure to eat may be arising out of a belief that the child needs to eat more or a preference for a larger body size.

Notably, Chinese mothers were more likely to use restrictive parenting which in some studies has been associated with a higher risk of overweight. However, although research suggests that restriction can lead to disinhibition and overweight, Chinese parents have been shown to have high levels of strict authoritarian parenting (a pattern reflected in this data) (Huang & Lamb, 2014). Research with younger

children has shown that restriction can decrease risk of overweight, until the point in which children have more freedom to feed themselves (Birch, 1991). If Chinese mothers are generally stricter, and as noted above see it as a cultural duty to prevent their child from adopting a Western diet (Wehrly et al., 2014), then perhaps continued restriction does prevent overeating. Indeed, in one study of Chinese parents, those who used an authoritarian parenting style that was high in restriction were less likely to have an overweight child (Pai & Contento, 2014). It would be interesting to explore the long term impact of this behaviour, once children have greater access to food.

Eventually, maternal own eating behaviour is associated with maternal child feeding style. Mothers who have higher levels of emotional eating are more likely to use emotional feeding styles with their children (Wardle, Sanderson, Guthrie, Rapoport & Plomin, 2002). Parents who use food to control their own emotions, use the same logic when deciding how to respond to their children's emotions (Tan & Holub, 2015), and there is a strong link between maternal and daughter emotional eating (Lauzon-Guillain et al., 2009). There is therefore a link between mothers own emotional eating behaviour and child weight. Mothers who are high in emotional and uncontrolled eating are more likely to have children with higher desire to eat (Morrison, Power, Nicklas, & Hughes, 2013) and who are overweight (Hajna, Leblanc & Faught, 2014).

Maternal cognitive restraint is also linked to a higher use of restrictive feeding practices (Rodgers et al., 2013b), although the impact upon the child can be varied. In some cases mothers high in restraint are more likely to have children, especially adolescents, who adopted restrained eating themselves (Neumark-Sztainer et al., 2010). Conversely, this can lead to a higher likelihood of eating in the absence of hunger (Kral & Rauh, 2010) or emotional eating in children (Kroller, Jahnke & Warschburger, 2013).

Two key patterns therefore emerged in the data. Firstly, that Chinese mothers were more likely to use restrictive feeding patterns and be higher in restraint themselves, both of which are typically associated with lower weight. Conversely, mothers from South Asian backgrounds were more likely to show pressurising, instrumental and

emotional feeding patterns, and to be higher in emotional and uncontrolled eating themselves, which in turn are more likely to be associated with overweight. Findings from the National Child Measurement Programme consistently find that Chinese children generally are less likely to be overweight whilst South Asian children are more likely to be overweight. These data suggest that maternal preferences and behaviour might be playing a role. Chinese mothers have a preference for a lower child weight, showing restrained eating themselves, and using higher levels of restriction with their child. Restriction, if children do not have free access to food can be linked with a lower body weight.

Conversely, mothers from South Asian backgrounds are using higher levels of emotional, instrumental and pressurising feeding style, whilst preferring a larger silhouette for their child and displaying emotional and uncontrolled eating themselves. Why might this be happening? Higher levels of poverty and lower levels of education may in part play a role, but the data often held ethnic group, and time spent living in the UK as predictive. Potentially, factors directly associated with ethnicity and culture are affecting maternal factors.

As discussed above, cultural influences upon weight and body image have been noted (Brewis, 2011). In South Asian cultures, a larger body size is valued positively with associations with wealth and prestige (Brown & Konner, 2006) and accordingly, body satisfaction is often higher in South Asian compared to White British and American women (Ahmad, Waller & Verduy, 1994; Cachelin, Rebeck, Chung & Pelayo, 2002; Wardle & Marsland, 1990).

However, food and eating are not simply about body size; they are strongly tied to cultural identity, and are often part of how cultural identity and belonging is formed (Kumanyika, 2008). Research with South Asian adults consistently shows that food and family are both highly valued and intertwined (Maiter & George, 2003). Traditional foods are strongly seen as part of culture, and eating in certain ways and at certain times are seen as a way of staying attached to family and community (Lawton et al., 2008). Cooking traditional foods using traditional methods, and coming together to observe how family members eat and celebrate with these foods can be an important part of culture (Pallan, Parry & Adab, 2012).

Therefore the behaviours identified in this study – instrumental, emotional and pressurising feeding styles may be heavily tied into culture and tradition. Likewise, the concept of bringing family together and learning and observing, may mean that maternal own eating behaviour – with a higher tendency for uncontrolled and emotional eating – is observed and modeled. However, traditional Asian foodstuffs, such as meat, ghee and traditional sweets, and traditional ways of cooking can be high in calories and fat, leading to overconsumption, especially if eaten in the absence of hunger (Anderson et al., 2005; Chowdhury, Helman, & Greenhalgh, 2000).

The opposite is also true, in that culture is tied to eating behaviour, and eating behaviour is not always a positive event. As noted above, emotional eating may also be a coping response to higher levels of stress and depression experienced by South Asian and Black women. The potential increased stress of immigration, loss of community, racism and poverty can affect both body image and eating behaviour as a coping mechanism (Sahi Iyer & Haslam, 2003; Reddy & Crowther, 2007).

One further issue is when original and new culture combine, and new unhealthy eating behaviours are adopted. Gilbert & Khokhar (2008) found that second generation South Asian mothers reported increasingly eating more Western foods, which were often higher in sugar than traditional foods. In fact, similar research showed that second generation South Asians tended to have similar unhealthy dietary behaviour to the White British (Smith, Kelly & Nazroo, 2011). Potentially, if South Asian mothers are continuing to use food in an instrumental and pressurising manner, but these foods are now typical British foods higher in sugar, could this combination lead to increased overweight? In the current research, the longer mothers were in the UK the higher their emotional eating behaviour.

This study does have limitations. Firstly, it examined behavioural practices alone and did not examine aspects such as genetic contributions to weight. Genetic variations have been established between groups for genes that contribute to weight and eating behaviour (Day & Loos, 2011; Nazroo, 1998; Wulan, Westerterp & Plasqui, 2010). It is highly likely that there is an interplay between genetics and environmental factors (Herle, Fildes, Steinsbekk, Rijdsdijk & Llewellyn, 2017; Wardle & Cooke, 2008) in

this case, maternal feeding interactions, and further research could examine this in greater depth.

Secondly, clinical measures of child weight and height were not taken, but this allowed for a larger and more diverse data set to be collected compared to researcher led measurements. Self report weight data is often low in accuracy and can be a sensitive question to ask, even in an anonymous survey (Bowring et al., 2012; Lin, Deroo, Jacobs, & Sandler, 2011; Pursey, Burrows, Stanwell, & Collins, 2014). Further research may wish to take established anthropometric measurements, particularly as noted above that fewer mothers perceived their child was overweight or obese compared to UK averages.

Thirdly, the sample was self-selecting, and although a variety of ages and demographic backgrounds were seen, was weighted towards older, more educated and affluent mothers. Only the most interested mothers may have taken part. However, this is a common issue with most behavioural research, not only with survey based designs.

Related to this, it was a challenge to recruit a large-enough, ethnically diverse sample, which the current predominance of White participants in the extant literature has demonstrated. This meant that all South Asian participants needed to be considered as one group, e.g., combining those from Indian, Pakistani and Bangladeshi groups. However, it is likely that sub-group differences exist. Future research should seek to collect a sample size large enough to perform sub-group calculations.

The research also relied on internet recruitment to increase the diversity of the sample. Internet based recruitment methods have been criticised as being biased to the more affluent educated participant in the past (Azar, 2000). However, in recent years, with the vast spread and availability of the internet on pocket devices, these limitations no longer hold. In 2017, 89% of UK adult had internet access. In addition, with the age range, 99% of those aged 16-24 and those aged 25-34 and 97% of those aged 35-54 had used the internet in the last 3 months (ONS, 2017). The approach has become popular particularly in the health and social sciences to reach a large

audience, efficiently and with ease. It is always possible that non serious responses may arise, but motivation in this type of research is unlikely to be high, and to be weakened within the scope of the large sample size (Buchanan, 2000).

Ultimately, the issue of classifying ethnicity should be raised. In order to compare groups, researchers typically use set classifications of ethnic identity e.g. (White British, Gypsy/Traveller/Irish Traveller, Asian or Asian British: Indian, Asian or Asian British: Pakistani, Asian or Asian British: Bangladeshi, Asian or Asian British: Chinese, Asian or Asian British: Other, Black or Black British, Mixed or multiple and other). However, in real life, people do not always fit within such neat boxes.

There is the risk of bias and over generalising to suggest that everyone who falls within a certain ethnic group is in some way the same. Publicly categorising people in this way can lead to marginalisation and exclusion and individuals might not perceive themselves as fitting within these defined groups (Aspinall, 1997). This can also lead to overgeneralising of groups when there are clear sub cultures within them. For example, in this study (and in the census and many other datasets), participants from Asian Indian, Asian Pakistani and Asian Bangladeshi were clustered together as South Asian group. It is possible that variations may be found within as well as between these larger groups (Bhopal, 2007).

There is also a tendency for researchers (who are often themselves from White backgrounds) to always use White populations as the default comparative group. Ethnic minorities are compared to the ethnic majority group. Of course from a research and statistical standpoint this might be expected – comparisons are often made to the largest reference group. However, this approach could also be interpreted as White ethnicities being viewed as the ‘normal’ group (rather than simply the most common) or even the desired norm from which others deviate (Bradby, 2003). Using the term ethnicity as a means of categorising people based on one background factor could be interpreted as another form of marginalising minority groups in society (Spencer, 2014).

However, standardised classification of ethnicity in general is useful and is very common in the context of health studies in order to address health inequalities

(Bhopal, 2007). Identifying broad differences between groups can help direct tailored support to communities (Chauhan, 2008). Care must be taken in the dissemination of these findings in order not to perpetuate (accidentally or not) racial stereotypes, and to realise that there are as many differences within ethnic groups as there are between (Bradby, 2003).

Bringing this chapter together, novel and interesting patterns arose within the data. These results clearly point to a pattern in maternal preferences for child weight, maternal child feeding style and own eating behaviour that may be contributing to established differences in child weight between ethnic groups. This is particularly apparent amongst South Asian mothers, who showed preferences for the largest body shape, more pressurising and emotional feeding styles and own disinhibited eating. Although a pattern related to lower weight and restrictive child feeding and own eating practices was seen amongst the Chinese group, the South Asian findings are of particular significance as they relate to an increase in child overweight and obesity in this group in the UK. The next and final stage of the research will be to explore this in more depth.

Chapter 5

Exploring pressurising and emotional feeding styles amongst South Asian mothers

5.1 Background

The findings of studies one and two highlighted several consistent themes in understanding maternal factors that might influence differences in childhood obesity levels between ethnic groups. These included perceptions of child weight, maternal child feeding style, maternal own weight and eating behaviour, and family influences, alongside relationships with social factors such as poverty, education and time spent in the UK. Specifically, in study two, mothers from South Asian backgrounds reported preference for a larger child body size, greater use of pressurising, emotional and indulgent feeding, and higher emotional and uncontrolled eating patterns themselves. Conversely, mothers from Chinese backgrounds reported preference for a smaller child size, restricting feeding practices and greater restrained eating. Higher levels of authoritarian (South Asian and Chinese) and permissive (South Asian) parenting partly explained these, coupled with greater incidence of deprivation, but did not fully explain the findings.

Although not all research is conclusive, maternal beliefs and behaviours are known to be associated with child weight in broader obesity research (Baughcum et al., 2000; Black et al., 2015; De Lauzon-Guillain, Musher-Eizenman, Leporc, Holub & Charles, 2009), but critically little research has examined differences in these behaviours, and their influences between ethnic groups in a UK sample. As noted previously, research in the USA has explored variations in maternal perceptions of child weight (e.g. Boutelle, Fulkerson, Neumark-Sztainer, & Story, 2004; Chaparro, Langellier, Kim, & Whaley, 2011) maternal feeding style (e.g. Matheson, Robinson, Varady & Killen, 2006; Spruijt-Metz et al., 2006) and own body image (e.g. Cachelin, Rebeck, Chung & Pelayo, 2002) between ethnic groups.

However, this research has predominantly focussed on Mexican and Black American mothers, and is not necessarily translatable to UK based populations, where South

Asian, Chinese and Black African-Caribbean ethnicities are the largest groups. The findings in study two supported the limited existing research on differences in maternal child feeding style between ethnic groups conducted in the UK, which found differences amongst mothers with preschool children. Mothers from South Asian and Black Caribbean parents showed high levels of pressure to eat and emotional / instrumental feeding (Gu, Warkentin, Mais, & Carnell, 2017), and mothers from Pakistani backgrounds using more pressurising feeding approaches (Fairley et al., 2015) compared to White British mothers. Data from study two therefore supports these patterns, extending them to school aged children.

The next step is to understand why maternal beliefs and practices might differ between ethnic groups in the UK. The findings in study two echoed patterns found in previous research, but did not fully explore why these might be occurring. The analysis controlled for aspects such as parenting style and demography but did not consider how cultural factors and experiences may be playing a role. Delving deeper into why these patterns might arise is important, both for future research and understanding how to best support families to make the healthiest choices.

Food choices in themselves are often complex, and as humans we eat for a variety of reasons unrelated to need to energy and nutrients alone (Ogden, 2011). There are many reasons why maternal behaviours may differ between ethnic groups. Culture and food are closely entwined and decisions around food are often made within a wider cultural backdrop (Kumanyika, 2008). Food, cooking, and ways of eating can be strong traditions that contribute to and maintain identity. Food can become symbolic of emotion or belonging (Maiter & George, 2003), and allow people to belong to a social group or identity (Lawton et al., 2008; Vallianatos & Raine, 2008).

Traditional foods and cooking, and sharing meals, is central to South Asian cultures and strongly tied to family, belonging and religion. Food is associated with good hospitality, with the social norm that you welcome and accept people with food. Rather than simply being about food choice or preference, not being able to participate in preparing and sharing traditional cultural foods can feel like a decision to abandon community, family and religion (Gabaccia, 1998). For those who have immigrated to Western cultures, traditional food and cooking can be part of

maintaining ties to a home country, and feeling like the transition is eased (Chowdhury, Helman & Greenhalgh, 2000).

Specific traditional foods are closely linked to celebration, special occasions and rituals (Mukherjea, Underwood, Stewart, Ivery & Kanaya, 2013). Serving adapted (e.g. low fat or alternate) foods would be considered inhospitable and shameful (Grace, 2011). Predominantly women are responsible for serving these foods and preparing and serving these foods has been shown to be part of female and maternal identity, although this does show variation between families and individuals (Bush, Williams, Bradby, Anderson, & Lean, 1998).

Understanding how these wider background cultural influences around food and family might influence mothers and their interactions around food and eating with their children is therefore important. Therefore, the aim of this final chapter was to explore beliefs around food, culture and mothering amongst South Asian mothers in more detail, using a qualitative approach. The decision was made to focus on exploring in more depth pressurising and indulgent patterns of child feeding found amongst mothers from South Asian families (rather than opposite patterns in Chinese mothers) given the increased risk of child overweight and obesity in this group. Although children from Black backgrounds are also more likely to be rated as overweight, the findings in chapter two did not identify significant high levels of maternal controlling feeding behaviours or uncontrolled eating behaviours in this group, suggesting that potentially differences may be due to natural body mass composition rather than maternal influences (Shaw et al., 2007).

Two key research questions were therefore identified:

1. Do the patterns of maternal perceptions around child weight, feeding style, and own eating behaviour identified in study two, particularly around pressurising and emotional feeding and eating behaviour, emerge in qualitative exploration of this topic?
2. What wider cultural factors are driving beliefs around child weight and eating behaviour for South Asian families?

5.2 Methodology

Design

A qualitative focus group design was used. A qualitative approach matched the aims of this final study because of its exploratory nature and ability to further probe and understand reasons for behaviour. Qualitative approaches are particularly useful in uncovering knowledge about the factors that shape cultural context (Braun & Clarke, 2013). Open ended questions can be used to understand new factors and help to generate new ideas that may not previously have been understood (Bryman, 2008; Kitzinger, 1995). It allows questions to be sensitive and flexible, according to the data collection context (Mason, 2002). Therefore, as the aim of this research was to better understand patterns uncovered in chapter two, a qualitative approach matched this need well. It allowed participants to express their feelings and thoughts of a specific topic in an open discussion, rather than forcing fixed responses.

Focus groups were chosen, as they yield important information on the participants' experiences in a specific topic, regardless of the similar or different views involved (Bryman, 2008; Patton, 2002). Focus groups can generate new ideas through the participants' spontaneous interactions and debates with one another (Liamputtong, 2011). They therefore offer access to a wide variety of experiences and thoughts which are not obtainable from individual interviews. The interactions of participants in a focus group setting result in rich data on what actually people do, rather than what they just say (Green & Thorogood, 2004). The focus group facilitator has the chance to ask questions using prompts for clarification with participants which allows for follow-up questions (Holloway & Wheeler, 2002). This is particularly appropriate as group social interactions naturally encourage respondents to discuss topics, and even the sensitivities they have about some of them. In addition, focus groups are a good method to access groups viewed as 'hard to reach' such as those members of ethnic minority groups, urban youths and migrants (Barbour, 2007). People feel more secure in discussing the subject when they are among group of people drawn together by a shared interest (Kitzinger, 1995; Krueger & Casey, 2015).

Focus groups can have disadvantages primarily that the researcher has more difficulties in managing group interaction and less control over the process compared to one-to-one interviews (Holloway & Wheeler, 2002). Barbour (2007) states participants in focus groups may feel anxious or uncomfortable expressing their view points, fearing peer group retribution. Relationships between participants (especially within relatively smaller communities) might impact upon what individuals say (Green & Thorogood, 2004). Therefore, it is essential to confirm focus group rules at the start of the interview to protect participants and encourage rich data collection.

Finally, using focus groups in this study enhanced triangulation of findings (Creswell & Clark, 2007; Tashakkori & Teddlie, 2003). Applying a mixed method approach can increase the validity of the information gathered (Green & Thorogood, 2004). Using both quantitative and qualitative methods within a larger piece of work enabled data from each stage to confirm and cross validate themes adding rigour, credibility, and richness to the finding and overall conclusions (Creswell & Clark, 2007; Flick, 2007). The earlier quantitative chapter enabled themes to be identified, whilst focus groups will allow these themes to be explored in depth (O’Cathain, Murphy, & Nicholl, 2007).

Participants

Mothers were of South Asian background with children aged 5 – 13 years old living in Swansea. An upper age limit of 13 was giving in order to allow participants with recent experience of primary school aged children to participate. In addition, participants had to be resident in the UK, over the 18 years of age, and able to participate in the focus group in English. Exclusion criteria included inability to consent and major child or maternal health problems that might impact on diet and eating behaviour.

Measures

Three separate focus groups were held, involving 3, 4, and 3 participants respectively. Holloway & Wheeler (2002), state that an ideal focus group size is around six, but can realistically vary from 3 – 12 participants. Smaller focus group sizes allow individuals more time to express their views, and can feel less

overwhelming for participants especially for potentially sensitive subjects such as the topic of mothering and eating behaviour (Krueger & Casey, 2015).

The focus group followed a semi-structured format, using an interview schedule with open ended questions (Bryman, 2008). Questions were based on themes that emerged from study one and two and included the importance of food in culture, food and mothering, food and family, and the role of demographic context. A full schedule can be seen in Appendix (4D). Interview schedules can be structured, unstructured or semi-structure. Structured schedules are used more to generate quantitative data, with pre-set schedule of closed questions, whilst unstructured and semi-structured are used in order to elicit an in-depth participants insights (Bryman, 2008). A semi-structured approach was chosen to give the participants greater freedom in expressing and personalising their answers by telling their own experiences. Semi-structured questions also provided a degree of consistency between focus groups about what was asked, yet they also allowed flexibility to explore particular perspectives with each participant.

Focus groups as a method of qualitative study rely on the dynamics of group interaction, which create the benefits of discussion in which meanings are inevitably co-constructed (Holstein & Gubrium, 2004). In addition, whereas interviews offer a good opportunity to explore the micro narrative of participants' experience or belief, the dynamics of focus groups can also provide further opportunities to clarify more macro concerns (Kitzinger, 2005; Wilkinson, 2004). The moderator was aware that all participants should be allowed opportunities to speak, but that the focus group should not become, as Lambert and Loiselle (2008) caution, 'an inexpensive substitute for individual interviews'. In a focus group, the moderator uses facilitative strategies, such as summarising, paraphrasing and clarifying the participants' perspectives, to enable the periodic review of the discussion (Redmond & Curtis, 2009).

Before the focus group began, participants completed a brief questionnaire to record maternal and child demographic background including maternal age, education, number of children, place of birth and duration lived in the UK (see Appendix 4D).

Procedure

Data collection was conducted between March and May 2017. To recruit participants, paper and online study adverts were created explaining the aims and procedure of the study, and asking interested participants to contact the researcher for more details (Appendix 4A). After permission was granted, posters were placed around the University campus, in local community centres, and in religious centres such as the Mosque. Adverts were also disseminated via social media (Twitter and Facebook). Finally, local South Asian centres were contacted to share a study advert poster and letter with potential participants. For example, study information was distributed via Swansea city mosque because the majority are Muslims (no temple), South Wales Indian society, and student groups.

Potential participants who contacted the researcher were sent an information sheet about the study (Appendix 4B) via email or post which fully explained the procedure and data collection. If still interested, participants completed a consent form and returned it to the researcher. Once three to four participants had consented, a mutually convenient time for the focus group was set up. The first focus group involved 3 participants and was held at a University campus. The second and third focus groups were held at the city mosque with 4 and 3 participants respectively. Holding focus groups in these venues ensured participants could attend the focus group with little cost or travel difficulties. Participants also received a £10 shopping voucher for their time.

All focus groups were led by two researchers (further details below) and lasted between 1 – 1.5 hours each. All were conducted in the English language. At the start of the focus group, participants were welcomed and whilst waiting for the remaining members, participants completed the brief demographic questionnaire. Once all were present, introductions were conducted before some general ice breaker questions were posed. These questions included inviting participants to talk about their family e.g. how many children they had, what was their favourite thing to do, where they live and where they consider home. Specific questions from the interview schedule around food were then commenced, with the researchers using probes to expand or clarify information given, encouraging interactions between participants to further develop (Billson, 2006). Discussion was recorded by Dictaphone, and transcribed as

soon as each focus group was completed. Field notes were also collected to support transcription and analysis of the data.

The decision was made to use two researchers (the lead, and a supporting researcher) for a number of reasons. Firstly, from a practical perspective, it enabled notes to be taken alongside the audio recordings and gave more balance to the discussions by having two leads. However, the main reason two researchers were used was to reduce gender and cultural barriers. The lead researcher was male, which could cause a number of issues with female participants sharing data. Willingness to share information with an individual who was not a mother / female may have reduced honesty or depth of responses. Conversely, power relations (exacerbated by culture) may have affected responses with participants feeling that they must answer questions they felt uncomfortable with, or to give the desired response. Therefore, a second researcher, who was female and a mother of a similar age to break down the barriers of the lead researcher asking mothers about their children. She focussed on taking notes, but also joined in the discussion, acting as a second facilitator.

The researcher was also aware that conducting research with ethnic minority groups can encounter cultural barriers, in terms of participant identification and trust in the researcher and potential conscious or subconscious power imbalances. Where possible, matching the researcher to participant backgrounds at least on some levels, can help reassure participants and increase trust and openness, increasing the likelihood that they are perceived as an 'insider' (Grewal & Ritchie, 2006). In this case, the lead researcher shared many important commonalities with the participants in that he was of non-White and non British background and shared a dominant South Asian religion (Muslim). The selected second researcher was also of non-British background, increasing feelings of shared background and acceptance (Khambhaita, Willis, Pathak, & Evandrou, 2017).

Ethical considerations

Full ethical approval was granted by Swansea University Research Ethics Committee, and followed the 1964 Declaration of Helsinki. All participants were provided with a study information sheet before agreeing to participate in the study. All participants gave consent at the start of the focus group.

At the beginning of the focus groups, participants were given an information sheet explaining focus group rules. This was read and discussed at the start of the interviews and the confidentiality element reminded at the end. Participants were reminded that they must not share details of focus group discussion outside of the focus group. Emphasis was placed on a supportive environment, and understanding each other's views. For each main question all participants were given the opportunity to share their views, with further opportunity at the end of the focus group for participants to add or clarify their views. However, participants were reminded that if they gave information that was seen as putting their child at risk then that information would be passed on to the appropriate services.

Data analysis

Data analysis took place in two stages. Firstly, data from the recordings was transcribed. A simple qualitative descriptive approach was then used to identify themes in the data (Sandelowski, 2000; 2010). This approach focuses on describing the experiences of the respondents in everyday language. Rather than attributing inferred meaning to responses like other qualitative approaches might adopt, qualitative description stays close to the data, describing participants data in their own words (Sandelowski, 2010).

As part of this a thematic analysis was performed to identify key themes in the data following the approach of Braun and Clarke (2006). To undertake this, firstly the researcher listened to each audio recording, and then transcribed it into text. The first script was then read again in order to identify initial themes. The script was then coded to reflect these themes. This process was then repeated on the second script, and then the third, identifying where codes matched. Scripts were then read, and re-read, adjusting and refining codes for consistency across scripts. After all data was coded, the thematic analysis took place. Codes that share similar patterns were merged into themes, giving themes and sub themes. These codes were shared with two other readers, and agreement found in over 90% of cases. The remaining codes were discussed and agreement found.

Trustworthiness

Trustworthiness, as first described by Lincoln and Guba (1985), involves four elements relevant to qualitative research that must be adhered to, these include trust value (credibility/internal validity), applicability (transferability/external validity), consistency (dependability/reliability), and neutrality (conformability/objectivity) (Thomas & Magilvy, 2011).

In order to enhance trust value, transcripts were checked several times, searching for similarities across the data. Direct quotes were used to support the themes and are included in the presentation of the results that follows. Codes and transcripts were checked and discussed with two research supervisors. Applicability was enhanced by collecting demographic details of participants to avoid over generalisation and transferability of findings. Consistency was supported by ensuring analysis followed the aims and purpose of the study, ensuring participants met inclusion criteria and explaining the methodology clearly. Finally, neutrality was enhanced by checking the coding and interpretation with two further researchers (supervisors), with a final version read by a researcher who was independent from the data design and collection.

Rigour

To enhance the rigour of the qualitative study, the methods identified by Seale and Silverman (1997) were used. These techniques involved recording the data using an audiotape device, counting the number of events to address any concerns about the reported data and using purposive sampling to help obtain a representative sample to increase the generalisation potential. Upon completion, data were transcribed and checked, and themes were discussed with a second rater. In addition, clear descriptions of the study settings were provided, characteristic of the participants, the data collection itself, the analysis process and the presentation of findings with appropriate quotations. Enhancing these aspects can improve the study's rigour and reinforce the findings' trustworthiness (Graneheim & Lundman, 2004).

5.3 Results

A total of ten South Asian mothers who took part in the study represented ethnic group eight participants were Bangladeshi, and two Pakistani. Eight were born outside of the UK, and two born within the UK. Six of those born outside the UK came to the UK as children, with two coming as adults. The mean age of participants was 38.8 years with a range from 33 to 48. Six out of the ten participants had a degree qualification or above. Further participant characteristics are shown below in Table 24.

Table 24: Participant characteristics

Participants	Characteristics
(Group 1) P1	Bangladeshi, born outside UK (came at age of 5), bachelor degree, 39 years old – 2 children
P2	Pakistani, born outside UK (came at age of 12), master’s degree, 42 years old – 2 children
P3	Pakistani, UK born, bachelor degree, 33 years old – 2 children: 11 and 13
(Group 2) P4	Bangladeshi, born outside UK (came at age of 12), high school, 39 years old – 2 children
P5	Bangladeshi, UK born, bachelor degree, 36 years old – 3 children: 7, 9, and 11
P6	Bangladeshi, born outside UK (came at age of 3), GCSE, 48 years old – 5 children: 13, 20, 22, 24, and 26
P7	Bangladeshi, born outside UK (came at age of 2), GCSE, 36 years old – 3 children: 7, 14, and 16
(Group 3) P8	Bangladeshi, born outside UK (came at age of 4), college degree, 34 years old – 3 children
P9	Bangladeshi, born outside UK (came at age of 30), master’s degree, 40 years old – 3 children
P10	Bangladeshi, born outside UK (came at age of 26), master’s degree, 41 years old – 3 children

A variety of themes were raised with regards to food and family in South Asian culture. The thematic analysis identified four main themes, split into 17 sub themes. An overview of these themes is shown below in Table 25. Two key questions were therefore formed; Firstly, do mothers from South Asian backgrounds use feeding styles high in control? And secondly, what factors drive these behaviours?

Table 25: Themes and sub-theme

Themes	Sub-themes
Maternal feeding style	Promoting intake of healthy foods Restricting unhealthy foods Pressure to eat Using food as reward or for emotional reasons
Importance of food in culture	Centrality of traditional foods Traditional foods as celebration Traditional foods to carry on tradition Creep of Western diet
Food and family	Maternal responsibility Fathers role Grandparents influence Food as bringing family together Food is part of showing love – hospitality
Role of demographic context	Time spent in the UK Western friendships Education Role of schools

Question One: Do mothers from South Asian backgrounds use feeding styles high in control?

A key aim of this study was to explore the feeding concerns and behaviours South Asian mothers typically had around food and their child. Questions specifically explored how food was used, concerns mothers had, and wider connotations about what food meant.

A number of clear feeding style behaviours were identified, primarily around concerns about restricting intake, but also concerns around increasing intake and using food in non-nutritional ways such as bribing children or using food as a reward. Food was often used as a parenting tool to control or shape children's behaviour, rather than simply being just nutrition.

Promoting intake of healthy foods

Firstly, all mothers expressed the desire to encourage their child to eat a healthy diet, high in intake of fruits and vegetables and low in intake of perceived 'junk foods'. Mothers saw a healthy diet as important to health and were aware of the nutritional value of different foods. They talked about different ways that they tried to persuade their children to try different foods and eat what they perceived to be nutrient dense foods.

'I want to make sure they are eating the right kind of food in order to know how their body is growing, and how to maintain a healthy body. So it's not just about he had something it's better than nothing' (P1).

'I try to give them fruits or milk they don't want to but I try' (P9).

'I manage do you know in different ways disguise and try to get her to explore the taste...always say to her look because it's your favourite colour ...you have to try these green things' (P2).

A number of mothers also raised the idea that educating their children about the nutritional content of food was critical. Mothers saw it as important that children knew what healthy food was and how to make healthy choices.

'I think it's important not only full up but they need to know what is the foodit is sufficient to them, like is it healthy food or not healthy like other food they have to know this' (P9).

'I think it's important for them to know if the food they have is it good or bad, sufficient and healthy' (P10).

Restricting unhealthy foods

All mothers talked about trying to restrict intake of foods that they saw as unhealthy. Restricting snacks, sugary drinks and fast food options was a common concern and behaviour, and mothers tried to keep strict control over monitoring what snack foods their children ate and when. Mothers felt that they needed to keep alert as to which

foods were being consumed and try to exert some level of control over their consumption, so that children had to ask and gain permission first.

'If they have chocolate or crisps from the cupboard they have to let me know they taking or they have to ask my permission' (P8).

'My daughters never buy anything without asking me they always ask me and then buy or ask me at home and when I say you can take then yeah they take' (P10).

However, as children grew older this became more difficult. Many battled with older children who would simply buy these foods themselves even though they knew their mother did not want them to. Older children had access to money and local shops and would simply buy restricted foods and try to hide it from their parents.

'My older boy (aged 12) he always keeps stash of sweets because he goes to shops and buy because when I go to his room to get the dirty clothes I can see a stash of sweets or next to his bed side' (P8).

Notably, whenever mothers talked about 'unhealthy foods' they always referred to typical 'Western' foods such as takeaways, sweets, chocolate and crisps. No participant raised the idea that traditional foods (which are discussed in detail below) would count as unhealthy foods that should be restricted.

'I do not bring home all the naughty things like chocolate and crisps because he (aged 11) finds them and he eats them' (P3).

Pressure to eat

However, although mothers reported restricting certain foods, at the same time, their use of pressure to eat was high, particularly around the concept of finishing all food on their child's plate. Mothers believed it was very important for their children to finish everything that they were given and would admonish children to persuade them into finishing everything on their plate. Waste was a particularly strong point among participants with many of them feeling very strongly that it must be avoided.

'They have to finish their food even with my little son (age 7) he knows that it's not right to waste food so then he finish itthey do understand that wasting is wrong' (P7).

'It's important to finish the food I don't know if it's good thing or bad thing' (P5).

Participants described how they used various methods of pressurising their child to finish, linking the need to finish their food to religion or concepts of being a good

child. Reference was made to those who were less fortunate or the idea that evil would thrive if food was wasted. Mothers often alluded to the need to finish food available as in other countries children were going without food.

'My little one (aged 11) does like to leave food and I always used religion as a source of saying we cannot leave food we cannot waste food you know' (P2).

'Sometimes I say you shouldn't waste your food, if you waste your food evil will eat it. Do you want evil to eat you portion, she replies "no mum" "ok then finish you're plate", then she finishes her food' (P10).

Finishing all the food on the plate was also perceived to be part of being well behaved, and mothers often used high levels of pressurising (controlling) behaviour to get children to adhere to their beliefs and finish what was on the plate. This was also linked to a level of emotional feeding; good children would obey their mother and finish all their food.

'I say look your two sisters finish their food, everybody is good girls, you are also a good girl so you have to finish. Do want to be a good girl she (aged 6) says "yeah" then I say ok finish your food like this' (P10).

Using food as rewards or in response to emotions

The concept of shaping children's behaviour through reward was also strong, and in many cases food was used to persuade children to act in a certain way, or to reward their behaviour. This included aspects such as using a favourite food in order to persuade the child to eat their dinner, or a food they did not like. Food was seen as a way of being able to get things done as children were more content or distracted if they were eating a favourite food. Some also used food to get children to do things they did not want to do, or to stop behaving in a certain way such as crying or making a fuss.

'With daughter (age 4) she always prefers dessert before food, anything so I would say if you finish your food then you can have your dessert' (P1).

'Sometimes but my middle one (aged 11) she likes subway sandwich so I say ok if you do this I will give you subway' (P10).

'If they want ice-cream and they cry for ice-cream I always say because you cry you cannot have' (P3).

A high level of using food as reward was seen. Food was closely tied to success. If children or other family members had done well, they were rewarded with foods, or family met to share foods to celebrate and show their pride. An explicit link was often made between the achievement and the food reward.

'We rewards with meal if they done well like in assessmentI treat it with Kaspas restaurant (sweets and deserts /milkshake) or Verdi's restaurant' (P2).

'If somebody passed something or somebody got an award anything like that you know we just do gathering with food so yeah it's celebrating through food' (P1).

Others reported using food to manipulate or meet children's emotional needs, such as making them less unsettled or cheering them up if they were upset.

'It's not the always the case ...for example with my daughter (aged 4) she been recently introduced to the chewing gum....so if she is upset I give her one and she is happy' (P1).

'When they hungry they do cry and fight unnecessarily, but when they become full they stay 2 -3 hours happy and they want to play long time' (P9).

However, not all participants reported this, preferring to use other methods to shape their child's behaviour such as toys or other treats.

'No not in my house, not with food because I have got two boys (12 and 8) and they are older and they like games, toys and going out, so I take them to the park' (P8).

'My youngest one (aged 6) she likes toys ...whenever she do something she asks can I have a toy then me and my husband say ok choose for the store then she go for the toys section' (P10).

Variations in feeding style identified in study two were therefore reflected in the focus group data. Mothers reported using pressure to eat and food in emotional and instrumental ways in order to shape their child's behaviour. The second key question was therefore why might these behaviours be so common? How might other cultural and religious factors affect mothers' decision to use food in this way? Three key themes were identified in this section: the importance of food in culture, foods and family and demographic factors.

Theme two: Importance of food in culture

A central theme identified from the analysis was the importance of traditional foods in South Asian culture, with sub themes identifying how common traditional foods

were, how they were used in celebration and their role in maintaining identity. Food was described as being part of daily life and culture. Mothers saw themselves as predominantly responsible for buying, cooking and serving this traditional food, perceiving this as their role in supporting their family and bringing them together. Traditional South Asian foods were seen as nutritional but also part of continuing and staying close to culture, religion and family. However, in a final sub theme participants also identified how Western foods were starting to creep into the family diet.

Centrality of traditional foods

A key issue raised by all mothers was the importance of consumption of traditional foods in their daily lives. Typical cultural cooking must be present for the main family meals during the day whether lunch or dinner. Traditional meals described included curries (chicken, meat or vegetables) and rice or chapatti. Although other foods were often eaten, there was a shared belief in the importance of ensuring these foods were regularly eaten in order to ensure dietary choices were not 'lost' to a typical Western diet.

'Typical day would be form of curry either chicken or lamb or mince lamb and we eat it with chapati more likely' (P2).

'Lunch I always try to give them rice and curry different types of curries sometimes lamb or chicken curry' (P10).

Unlike many families in Western cultures, mothers also described how children were given family foods rather than special children's foods such as the common British meals of, for example, chicken nuggets and chips. Sometimes these were adapted to make them less spicy, but children were still expected to eat the same foods as adults, as it was important that they participated in cultural aspects of diet.

'I think when they are younger we try to control the level of spicy, mix it with yogurt potatoes but now I give them exactly what we eating because we treat them like young adults' (P2).

Traditional foods as celebration

Food and cooking, particularly of traditional foods, was seen as central to celebration and family connections. Special occasions were marked by making more elaborate meals, which were often brought together and shared. These foods were typically

home cooked and recognised as being richer and higher in fat, but were an integral part of celebrating religious, cultural or family achievements. Different families would often bring different foods that together formed part of a larger spread that you played your part in. There was a recognition that this often was too much, but not something that would be changed. This tradition and way of celebrating had been passed through generations.

'I think the food is the main thing when we celebrate anything or get together with our friends or his friends, yeah I try to make special food they like or buy from outside' (P9).

'Definitely it's the heart of any celebration is the food, with Bengali culture yeah my mum generation doing more than our generation they have to cook about 12 different dishes and that is the main course I'm talking about you know so the number of dishes is just endless' (P1).

'EID time or celebrations or if somebody pass exam like occasionally, we make that rich food and expensive' (P8).

Importance of carrying on tradition

Related to the two themes above was the importance of carrying on traditions, and how important following traditional ways of cooking and celebrating was to religion and culture. Traditions were seen as a huge part of identity, that children were encouraged to follow as it was part of 'who they were'. These traditions brought pride and a feeling of belonging; food was far more about simple nutrition or tastes. Mothers felt it was their role to ensure that this was carried on in their children, often pressurising and nagging them to eat certain foods because it was tradition.

'I keep saying to them "eat curry this is who we are". We eat halal because we are Muslim, so I keep telling them. Dates are a big thing in our house and every-day they want to eat dates, so it's about highlighting the right kinds of food to eat as part of our religion and foods from our culture' (P2).

'There is always lamb with potato or chicken with potato in my house every day, there always has to be one' (P8).

Creep of western diet

However, mothers also discussed how 'Western foods' (typically 'junk foods') were becoming a larger part of their diet, in part from pressure from children who wanted to eat the food their friends ate and they saw marketed, but also in part because they were a quick and convenient option. Mothers worried that if children wanted these foods they would refuse to eat traditional foods that they were given, so they

sometimes offered these options. Typically these foods were 'junk foods' such as pizza, chips or fast food.

'We would have frozen pizzas in the house because sometime they complaining they don't want rice they want frozen pizza' (P5).

'I will try to make some kind of English dish like something different so again something like pasta or lasagne' (P5).

Participants also identified how versions of foods that they could not eat due to religious / cultural dietary restrictions were now more likely to be available. For example Halal sausages were now available. Notably, these foods were also not typically healthy foods, exacerbating the creep of unhealthier Western diet options.

'Salami and sausages were not made in a halal way, but a few years ago they started to produce halal versions of these products, so they want to eat these foods sometimes' (P6).

Theme three: Food and family

Another theme running throughout the groups was the concept of food being central to family including women's own identity and place in the family as the mother. Food was part of family cohesion, and often a large part of bringing family together. It was a sign of love and hospitality, and something that brought people together, rather than simply nutrition. The importance of traditional food above was seen as vital for maintaining cultural identity and family networks and togetherness.

Food was also a major part of being a mother. Providing a nutritious diet, and particularly getting children to eat enough, was seen as synonymous with being a good mother and part of providing love and care to a child. Food was the responsibility of the mother and therefore a good mother fed her family and children foods that they enjoyed and would be nurtured with. However, despite this responsibility, mothers discussed how others, particularly grandmothers and fathers would often indulge the child with food, often against the mothers' wishes.

Food as integral to mothering

Food and being a good mother went hand in hand. Participants raised the idea that it was their responsibility to make food for the whole family. However, food was far

more than just nutrition, it was about love and care, and participants often reported making special meals just for one child because that was what their child loved. When the child then ate that meal, mothers felt that they had fulfilled their responsibility in ensuring that child had eaten and enjoyed food.

'I'm the one who make the food in the house' (P4).

'In my house I prepare the food but on my husband's day off he does try to do the lunch and the dinner, but mainly I cook in the house yes' (P8).

'When I go to my sisters houses or close family house I will ask them just to make sure there is curry for him specially' (P8).

Influence of fathers

Although mothers typically talked about their own behaviour, and viewed themselves as the primary caregiver who was responsible for their child eating (and finishing their meal), a number of mothers also mentioned how fathers also adopted this pressurising feeding style. Fathers would also worry that their child was not getting enough and should finish up all their food. This often stemmed from a concern that children needed to eat more and that they needed to make them eat.

'When my husband comes he focuses on encouraging her to eat, for example drinking a glass of milk and make sure she had her egg' (P1).

'I do let him sometimes feed them late in the night and we do have this occasion in my house like 2 o'clock in the morning he would get out and get some food if no body eat in the house' (P8).

However, fathers were often seen as more submissive, allowing the children to eat what they wanted. This was seen to stem from indulgence, a way of loving and caring for the child that they might not have seen so much of in the day. However, mothers often got frustrated that they tried to feed their child a healthy diet and then their father would come along and indulge their wishes.

'But the boy he is so hard and I think because his dad spoils him that is why I find it hard to stop him he is into his crisps he loves it and chocolate and his into his chocolate wraps chocolate sandwich' (P7).

'They will rummage the cupboard or force their dad to get them something' (P8).

Influence of grandparents

Although mothers commonly spoke about being the person primarily responsible for their child's diet, the influences of different family members, particularly

grandparents were often raised. The wider family often attempted to influence food choices, or timings, attempting to override the mother's influence, particularly around sweet and high energy foods, or making special meals for the child. Grandmothers (and others of that generation) often liked to 'spoil' the child with food and mothers didn't always feel that they had the power to override this, as the food was offered in a loving way.

'We have this problem; we have very active grandparents in our lives. So my mum will come home to my house and stock up my cupboard with chocolate and biscuits' (P2).

'Sometimes his grandfather would come and knock on the door and he is passing a bar of sweets' (P8).

Grandparents appeared to have significant power in deciding to give children foods, even when it was against the mothers' wishes. Grandparents often viewed themselves as having the right to give children those foods, irrespective of whether the parents wished this, and mothers felt helpless to this. Fathers tended not to intervene, allowing wider family to have this influence.

'My mum loves to force feed him and I cannot say to my mum stop' (P2).

Mothers reported sometimes trying to cut back on certain foods so that grandparent involvement had less influence overall. However, as children got older they became aware of these differences, knowing that they could source foods that parents might have banned by visiting their grandparents' house. Parents were not always aware of this, and therefore didn't realise potentially how much energy the child was consuming.

'With the older one (aged 12) if I restrict him from something he will go to his grandmother's house ...I know he is going for the food that I stopped him from having. Mostly I stop him from having too many biscuits and tea' (P8).

'When we go out to relatives and family houses I feel they exposed too much to sugar where deserts, crisps and chocolates and all of those things ... I find it very hard to control them' (P1).

Tradition and culture were often given as a reason why the grandparent should be allowed to control what foods the child was given. Often these foods were high in fat but sometimes children were also pressured by wider family members to eat foods

that they did not want or enjoy, because they were seen as traditional and the child needed to learn to eat it to continue cultural traditions.

'But with my mum...she does a lot of pressure you know she will try encouraging traditional Bengali foods. Even I probably would not go for, but she says I need to expose them to it so they will like it' (P1).

Food as bringing family together

Linked to the above theme of food as being a tradition that bound family, food itself was seen as a means for ensuring that family got together. Family meet ups were often based around food and the food was a central focal point to getting together. Everybody brought a dish and put effort into that dish to show love for those eating it. Food was even seen as a way for ensuring family members got together, in particular when they had not seen each other for a while or were visiting distant relatives. It was used as a 'bribe' to persuade people to come, or a loose threat that if they did not come part of the meal would be missing. Food therefore was closely tied to family, connection, love and social cohesion rather than simply being about hunger or nutrition. It would not be acceptable for somebody to eat a different meal beforehand, or not eat the meal provided, as that would be seen as a rejection of family, rather than simply based on hunger.

'It's an opportunity to be together to meet friend to enjoy to know each other and to spend time as a family and there is always food in it' (P3).

'Every event has to have food; you cannot have anything without food. Everything definitely every aspect even a meeting has to have food' (P2).

'It's more than just eating you need to gain together so socializing and everything' (P7).

Food as part of showing love

Closely linked to the concept of food being a social tool, food was also seen as a way of showing love between family members. Food, and the act of preparing and sharing it, was a way of showing love and welcome to others inside and outside the home. As a mother you showed that you loved your family by preparing them the meals that they liked, and you showed that you welcomed others by making them a meal. This means that food and meals could not be cheap or small in nature, or made quickly. A spread of food was representative of your love and welcome.

Meanwhile, eating said food was also representative of accepting said love and acceptance. If you rejected the food, or did not eat everything on your plate, it could be taken as a rejection of the individual. Children were therefore taught that you showed your love with food, and you ate food given as a sign of loving and accepting the love of others. This was ingrained from an early age with pressure to eat what others offered you, even when you might not be hungry. Mothers reported feeling significant social pressure to follow these rules and teach them to their children, even though they recognised, at least when they thought in more depth, the impact this could be having upon child weight. However, feelings of shame, embarrassment and anxiety about upsetting others were so deeply rooted that they overcame any feelings of hunger. Good people offered and accepted food, and therefore that is what they and their children strove for.

'I would say being Bangladeshi known for their hospitality with food, food is big social standing. The more you feed your guests the more you seen as personal with good character, kind. It reflects who you are and who you family is' (P1).

'So if you are in relatives' house or any friend house it's rude not to eat if they serving food to you they will give you big portion in each plate ... I mean even if you want to gather or invite someone over your house first thing is come over for food...it's about honouring your guest (P3).

'So if I invited you to my house on a rare occasion, if I did not give you food and it was just tea or coffee it would look so bad and rude. Although you would think it's fine it's just tea and biscuits but in my heart, I would be dying of embarrassment or feeling really guilty' (P5).

Theme four: The role of demographic context

As in the wider literature exploring demographic influences on food choice, mothers discussed a variety of socio-demographic factors that influence their food choices and the foods they serve their children outside of culture, religion and tradition. These included established predictors of diet and overweight including language and education. However, although these themes were raised by participants, this theme was not large, suggesting that although demography may play a role, it is not the key factor, at least from these mothers' perspectives.

Time spent in the UK

Mothers brought up the idea of cultural adaptation a number of times, discussing how time lived in the UK had affected their beliefs and behaviours around child weight and diet, or that they could see the influence in others. Mothers raised the idea

that those born in the UK often acted differently to those who were born overseas and had immigrated to the UK when they were children or adults. In particular, mothers felt that traditional practices, that were not always healthy such as adding lots of oil to cooking or food were highest among those who had been born outside of the UK.

'I do find a difference in the community between young women who brought up here and women who being married and brought over ... eating habits and food preparation are different...perhaps traditional or what I would classify it healthy are you eating that much or are you putting that much oil in your food, yeah I think there is slight difference between those household' (P2).

'One of my cousins she is from Bangladeshi she got married here she came when she was 18 she brought up 6 children now and recently I noticed her older child is 11 and he is overweight and the second one is getting that weight again I think she has not exposure to herself to the educational system here even she see food as managing the kids rather than what is happening to their bodies' (P1).

Language also played a role, in part due to its link with acculturation, but also because having English as a second language, or not having strong English, was a barrier in making healthier choices around food and diet. This meant information was not understood, or that practices from back home were relied upon as the language it was communicated in was understood.

'I think also the language barrier is affecting those people, I was telling the mums do not give them this highly sugar juice and they took a whole year to understand. There are so much additives and sugars in his diet. There is a language barrier and she could not understand orange juice or other juice' (P1).

Western Friendships

Mothers also discussed how friendships with White British mothers affected both their own eating behaviour and their child's choices. One discussion for example arose around the idea of mother's going on a diet and trying to make healthier food choices – something that might be seen as symbolic of a Western culture.

'My close friend, she encouraging me for years to eat more vegetables and fruits ...so we on this diet plan of eating more vegetables and fruits' (P2).

Children also started to adopt the behaviours of their white British friends, wanting to buy fast foods. Mothers were wary of them eating too many foods they perceived to be 'junk', but were also wanting their children to fit in so often allowed them this freedom.

'Boys they go out with their friends to the shops and they would ask for £2 or £5 ...the culture is different too and when they see other friends buy then they encourage to buy for themselves' (P8).

Education

Finally, participants raised the idea that educational barriers might be affecting knowledge and therefore food choices and weight. Mothers with lower levels of education were believed to make unhealthier food choices because they didn't understand information around diet and cooking, or they lacked the skills to be able to make meals with less energy or salt.

'I think education definitely does have a role to play in how we behave with our children' (P3).

'One of my cousins is from Bangladeshi, and she got married here. She came when she was 18 and brought up 6 children here. Recently I noticed her older child who aged 11, looks overweight. Also the second child is also putting a lot of weight on again. I think she has not exposed herself to the educational system here, even she sees food as managing the kids rather than what is happening to their bodies' (P1).

Role of schools

Participants also recognised the importance of children learning about food and healthy eating at school and hoped that their children would have greater knowledge about how to prepare healthy meals.

'I think schools do a good job by highlighting the healthy side to fruits so that also helps its encourage for us as a parents it not just us telling the children this is healthy ...the schools are doing this as well' (P3).

'The school is educating the kids and we are aware what is happening in schools and if you are not connected with the school or the society around you may be not as conscious of food' (P1).

In summary, the findings from the thematic analysis supported the findings from study two that mothers from South Asian backgrounds do report high levels particularly of pressurising and emotional feeding styles. However it also identified some of the reasons why mothers may behave in this way, highlighting how the role of South Asian culture and religion and its links to perceptions about how food is central to identity, family and love is leading to mothers to pressurise and persuade their children to eat for reasons other than hunger.

5.4 Discussion

The aim of this final study was to explore whether firstly patterns of emotional and pressurising feeding styles identified in chapter two were present amongst this sample of South Asian mothers living in the UK, and secondly to explore what wider cultural factors were influencing these decisions. The results confirmed the findings of study two; mothers reported high levels particularly of pressurising feeding styles, but also use of indulgent and emotional feeding styles. Exploration of these behaviours highlighted how closely maternal beliefs around food and her child, and subsequently her child feeding behaviour were associated with cultural influences particularly around food as part of tradition, family and love. The findings have important implications for those considering how culturally appropriate advice and support around feeding and diet can be given to diverse families in the UK.

Mothers perceived themselves as the ones responsible for their child's diet and way of eating, reflecting previous research (Bush et, Williams, Bradby, Anderson, & Lean, 1998). As part of this, they followed the pattern in study two showing high levels of pressurising and emotional feeding styles, such as pressurising their children to finish all the food on the plate, and using foods to reward, praise or bribe their children to eat. This echoes findings by Gu et al. (2017) and Fairley et al. (2015) who reported higher levels of pressurising feeding styles amongst mothers from South Asian backgrounds living in the UK. They also reflect higher levels of pressurising feeding practices amongst other non-White groups living in the USA such as higher use of pressure to eat amongst African American mothers (Spruijt-Metz et al., 2002, Spruijt-Metz et al., 2006) and Mexican mothers (Matheson, Robinson, Varady, & Killen, 2006).

These findings extend that pattern by highlighting why mothers use pressure to eat. For some, children were seen as needing to eat more and this may be linked to previous research that shows mothers from Black, Mexican and South Asian backgrounds are less likely to realise their child is overweight (Chaparro, Langellier, Kim, & Whaley, 2011), or prefer a larger size for their child (Trigwell, Watson, Murphy, Stratton, & Cable, 2013), viewing it as a sign of health and prosperity

(Lindsay et al., 2011). Some mothers therefore simply wanted their children to be a larger size and it was important to them that they therefore ate more food.

However, pressurising was about more than just children putting on weight and mothers described a number of reasons why they pressurised their children to finish food. Food choices and intake often have moral attachments and mothers often perceive themselves as responsible for their children, reporting a moral impediment to encourage children to eat in a certain way (Almerico, 2014; Nordström, Coff, Jönsson, Nordenfelt, & Görman, 2013). This emerged in the findings with mothers demonstrating a central belief that food should not be wasted and that children should finish all the food on their plate, as others could not. This was tied in part to knowledge that in 'home' regions many children would not have enough food. Religion also played a role, that food should not be wasted. In the Islamic faith, food is a gift of God and wasting food is not acceptable: wasting food needs to be prevented because it is considered squandering (Eliasi & Dwyer, 2002). This supports previous research with Indian Asians living in the USA, which reported how parents often pressurised their children to finish meals because it was a sign of respect to those in Hindu culture who did not have enough food (Momin, Chung & Olson, 2014).

Pressure to eat was also related to wider pressure put on children to be well behaved and 'good' children who finished their food. This reflects previous findings that mothers from South Asian backgrounds are more likely to use authoritarian parenting approaches where they are stricter in pushing their children to behave in a certain way (Ali & Frederickson, 2011; Ang & Goh, 2006; Raj & Raval, 2013). Parenting style has been linked to feeding style in previous research, including patterns seen in the previous study. Mothers who are more controlling in their parenting approaches are more likely to be more controlling in their feeding styles (e.g. Blissett & Haycraft, 2008; Hughes, Power, Connor, Fisher, & Chen, 2016). Mothers also discussed bribing or manipulating their child with food to act a certain way. Food was therefore a means of controlling the behaviour of children, making them act in a way that suited the mother. This echoes findings with other ethnic minority groups that have shown Hispanic and Black mothers in the USA are more likely to report

using food to calm or shape a child's behaviour compared to White American parents (Evans et al., 2011).

Food, and therefore pressure to eat, was often frequently associated with emotion and celebration. Families came together to eat and food became an important part of socialising and cohesion. Mothers reported how they were expected to eat to be part of this cohesion and modelled to their children that this is how you acted, in a way that carried on tradition. Participation was non-negotiable. Cultural identity and togetherness was therefore built and maintained through eating, meaning food was also very closely linked to showing love, respect and care for others. Food was not simply about nutrition, but about people and relationships. Considerable research has reflected on how food is often central to culture and forming cultural identity, with considerable pressure to conform to this (Stajcic, 2013). Food is a pathway to cultural identity and belonging, and is important in constructing ethnicity (Nordström, Coff, Jönsson, Nordenfelt, & Görman, 2013; Vallianatos & Raine, 2008). It is also an important tie to maintaining home cultures when families have moved (Chowdhury, Helman & Greenhalgh, 2000). These findings reflect how strongly this is present amongst families and food in South Asian cultures. If families failed to make or bring foods, or refused them, they were ultimately perceived to be making a statement about belonging and their identity.

However, as established in the literature, pressurising a child to eat when they are not hungry can lead to a break down in their ability to self-regulate their intake of food according to appetite (Harris, Mallan, Nambiar, & Daniels, 2014). Children can learn to eat according to external cues and direction, rather than internal cues of hunger (Benton, 2004). In experimental settings, children who are pressured to eat more consume larger portions of food (McPhie et al., 2012) and over time this can lead to increased risk of overweight (Stang & Loth, 2011) – potentially at least in part explaining increased risk of overweight amongst South Asian children in the UK. Bribing children to eat, or shaping their behaviour has also been linked to a risk of increased overweight (Baughcum, Burklow, Deeks, Powers, & Whitaker, 1998). Pressuring children to eat for cultural reasons would likely repeatedly teach children to eat in the absence of hunger, which is highly linked to becoming overweight, especially if traditional foods high in fat and energy are being consumed.

The concept of food being identified as a means of showing love is also important. Children were directly told this, but would also be observers from a young age. Food was being prepared, shared and eaten to demonstrate love, therefore attaching emotional significance to the food, making it synonymous with a means of receiving and giving love. Food was also prepared and eaten in response to achievement and celebration, establishing it as something that is done to reward these. Participating in these practices and traditional were mandatory and seen as a snub if ignored (Gabaccia, 1998). Notably, it was important to prepare food in traditional ways, reflecting findings by Grace (2011) that adapting foods to be lower in fat or energy would not be acceptable. This was directly communicated to children with them being told they must eat up all their food to show respect and gratitude to others.

Unfortunately, these beliefs and practices are at the heart of emotional eating. Although it is normal for food to be eaten for a variety of reasons other than simply hunger (Ogden, 2011), adults who frequently eat for emotional reasons are more likely to be doing so in the absence of hunger and are more likely to be overweight (Macht, 2008). Children who are given food for emotional reasons are more likely to be overweight (Webber, Hill, Saxton, Van Jaarsveld & Wardle, 2009). Emotional feeding can also lead to an increased chance of children eating in the absence of hunger (Blissett, Haycraft & Farrow, 2010) as children simply learn to overeat for reasons other than hunger (Jansen et al., 2018). It also increases the risk of them becoming emotional eaters themselves as adults, as they learn to associate food with controlling emotions rather than simply hunger (Rodgers et al., 2013a). In some cases emotional feeding can increase the risk of eating disorders, as food becomes synonymous with reward or unhappiness (Balantekin, Birch, & Savage, 2017; Gearhardt, Roberto, Seaman, Corbin & Brownell, 2013). Potentially this might be one explanation for findings that show binge eating disorder amongst South Asian women is not easily explained (Cummins, Simmons, & Zane, 2005).

A strong theme throughout the data was not simply the use of pressurising and emotional feeding styles, but mothers using food to pass on cultural knowledge to their children. Mothers talked about how they educated their children about the 'right' way of doing things according to culture and expressed how they must follow these rules to participate in family events, social occasions and generally maintain

cultural knowledge and identity. Mothers saw this as their responsibility to pass on this knowledge, directly talking to their children, but also modelling this behaviour to them by showing them how they hosted and accepted invitations of food (love) from others. Modelling is central to child learning across a range of behaviours (Palfreyman, Haycraft, & Meyer, 2012) and this applies to how children learn about food and eating. Child diet and food preferences often reflect maternal preferences for this reason (Brown & Ogden, 2004). Mothers did talk about how they tried to model to their children how to eat healthier foods, but did not perceive their pressure to eat traditional foods and for social reasons as modelling potentially unhealthy eating habits to their children.

Finally, children were also pressured to eat traditional foods that they might not like or enjoy because of the need for the tradition of eating these foods to be continued. However, research has shown that when children are made to eat a food they dislike, over time they are more likely to avoid that food (Brann & Skinner, 2005). Research has shown in experimental settings that pressurising can actually lead to an immediate decrease in preference (Galloway, Fiorito, Francis & Birch, 2006). Instead, positive behaviours such as modelling eating that food and enjoying it, encouraging children to just try it, and generally being positive, but not coercive are more likely to lead to children trying new foods (Addessi, Galloway, Visalberghi & Birch, 2005; Campbell, Crawford, & Hesketh, 2007). If traditional diets are important to cultural identity and to South Asian families, this is an important area for education, to promote children trying a wider range of desired foods.

Mothers also reported using some degree of restrictive feeding practices in an effort to control their child from eating too much of what they perceived as unhealthy foods. Interestingly, restriction seemed to stem primarily from preventing their children from eating Western foods which were considered to be unhealthy and 'junk food'. Reference was made to pizza, chips, sweets and cakes and biscuits. This reflects interesting findings in the USA where Chinese mothers reported using restrictive practices as a 'duty response' to prevent children from adopting unhealthy American eating habits (Wehrly et al., 2014). Although these groups are different in ethnic background, they both represent ethnic minority groups trying to prevent their children from changing traditional dietary patterns.

However, not once did mothers raise the idea of restricting traditional South Asian foods. Instead, traditional foods were to be encouraged and children pressured to eat them, as eating traditional foods was so integral to culture. Traditional South Asian foods are however often high in fat and energy (Anderson et al., 2005; Chowdhury, Helman, & Greenhalgh, 2000) and it is notable that although parents could identify typical Western foods as ‘unhealthy’ they did not do the same for traditional foods. Instead, mothers noted that they were concerned about the creep of Western foods into the diet, even though they sometimes allowed the children to eat these out of convenience. Research has shown that restricting certain foods tends to increase the preference for that food, therefore leading to overeating when the child does get the chance (Rollins, Loken, Savage & Birch, 2013). By trying to restrict intake of Western foods, mothers may be unwittingly increasing the likelihood that their children will eat them when given free access.

Although the primary focus of this research has been maternal beliefs and interactions, this study highlighted how others played a central role in affecting what and how their child ate. Grandparents were particularly influential, and often indulgent in their feeding approach, giving children what they wanted to eat (typically high fat or sweet foods). Mothers felt powerless to stop this, feeling that they could not say no. Research has shown that extended family relationships are perceived as important in South Asian families (Jackson & Nesbitt, 1993), with grandmothers often playing a major part in decisions around parenting and childcare, including food and diet (Kurrien & Vo, 2004). These relationships and interactions are seen as a valuable support to family in providing advice, friendship, guidance, social, and emotional support to mothers (Cooley & Unger, 1991). South Asian mothers often turn to their mother and mother in law for advice around child care and diet (Thomas & Avery, 1997).

Previous research has shown that South Asian grandmothers (particularly first-generation immigrants) have a lot of power over food and eating in families, and together with their perceptions that a larger child is healthier, often encourage grandchildren to eat more for this reason. Use of indulgent feeding styles is also high (Pallan, Parry, & Adab, 2012). This research echoed these findings, also supporting previous work that this can cause conflict with mothers who want more control over

what their children eat, but feel powerless to stop grandmothers from giving food to their child (Sonuga-Barke, Mistry, & Qureshi, 1998). Grandmother influence is therefore an important area to consider, as indulgent feeding styles place children at increased risk of overweight as typically foods given are energy dense or given in the absence of hunger (Hughes, Shewchuk, Baskin, Nicklas & Qu, 2008).

Further research is therefore needed as to how grandmothers could be involved in supporting healthier choices. In other areas of nutrition, educational interventions with grandparents have been shown to have a useful impact on generational and cultural knowledge. For example, one intervention in Bristol with South Asian grandparents to improve their knowledge of breastfeeding had a positive impact on reducing potentially harmful behaviours such as encouraging their daughters to discard colostrum or give special teas to the infants. Given in a culturally appropriate way, education can have a positive impact on changing attitudes and behaviours (Ingram, Johnson & Hamid 2003).

Interestingly, fathers were often seen as indulgent in their feeding behaviour. Although they were often authoritarian, pressurising the child to eat more, mothers frequently identified the father as also indulging the child. Studies on South Asian paternal parenting style in the UK are limited. One study found that fathers engaged in more indulgent and less authoritarian interactions with their children than mothers during meal times (Wilson, 2011). Likewise, in the USA, one study found that fathers were more permissive in general with their children than mothers (Tavassolie, Dudding, Madigan, Thorvardarson, & Winsler, 2016). Further research is needed in this area, but potentially interventions with fathers may be an important avenue.

As noted above, the findings have a number of implications for those supporting families, particularly around raising awareness of the potential impact of pressurising feeding styles and emotional eating. By encouraging children to eat for reasons other than hunger, to associated food with emotions or duty, and to consume food whether they are hungry or not is highly likely to lead to eating in the absence of hunger, taking in too much energy and subsequent over weight (Benton 2004; Ventura & Birch, 2008). Attention also needs to be drawn to the fact that traditional foods may

be equally as unhealthy as Western ‘junk foods’. Parents need to be made aware of the impact of them modelling these behaviours to their children.

However, of course, these messages need to be embedded within an appropriate, sensible and acceptable cultural context. It is clear that food – and ways of preparing and eating it – are highly embedded into identity, family and love. These things in turn play an important role in health; social wellbeing enhances lifespan and quality (Wiest, Schüz, Webster, & Wurm, 2011); and may be particularly protective for South Asian families. For example, children from South Asian backgrounds in extended families have better mental health and wellbeing than those living in traditional nuclear families (Sonuga-Barke & Mistry, 2000). Social relationships enhance wellbeing (McGoldrick, Giordano, & Garcia-Preto, 2005), and some research suggests this effect is greater for ethnic minorities in the USA compared to white Americans (Molix & Bettencourt, 2010). Research with South Asian families show that wellbeing is greater if individuals are supported by extended family rather than health professionals (Sheikh & Furnham, 2000).

Moreover, being part of collectivist culture is important for mental health for South Asian groups. Fear of exclusion, or not keeping with traditions and duty is a predictor of mental health difficulties, particularly amongst women (Gilber, Gilbert, & Sanghera, 2004). Religion and cultural practices are also tied to mental health, with participation in rituals being protective for South Asian women (Hussain & Cochrane, 2003). Therefore, any potential detrimental impact of food being used in social and emotional ways has to be considered from a bigger picture. It would be disrespectful and unhelpful to suggest that families change their entire way of eating to meet health advice, and highly unlikely for changes to be made.

Instead, perhaps small changes could be suggested as socially and culturally acceptable ways of making changes to diet. Wider research interventions that have taken account of the importance of cultural and religious factors have been successful. For example, one school intervention rescheduled it’s after school activity sessions as it recognised that many South Asian children attended mosque at that time (Pallan, Parry & Adab, 2012). Another intervention recognised the influence of men upon women’s activity, setting female only swimming sessions

(Carroll, Ali, & Azam, 2002). Interventions should work out what is acceptable and realistic to change. For example, beliefs and practices around food may not be moveable (Grace, 2011), but changes to physical activity or other non traditional elements of cooking and diet may be acceptable (Narayan, 1995).

The research does have its limitations. As with much research in health and social care, the sample was self-selecting meaning that only the most interested participants may have taken part. This was exacerbated by the study taking part in a local area that is not high in ethnic diversity, increasing the challenge of bringing participants together. Focus group numbers could have been higher, but the smaller numbers did allow all members to engage and discuss the content in depth. Participants were motivated and eager to share their findings with discussion lasting over an hour in all cases. The education level of the participants was higher than the population average, which means the outcomes may be biased towards well educated mothers.

Future research may also want to explore the findings in larger samples, or samples from more ethnically diverse areas to examine the impact of wider demographic contexts on findings. Potentially those living in regions with greater diversity may show even stronger patterns of behaviour. Related to this, although all participants were from South Asian backgrounds, all came from Bangladeshi and Pakistani backgrounds, none were from Indian backgrounds. Future research might wish to explore in-group (e.g. South Asian) differences or explore in more detail the impact of acculturation by including a range of participants in terms of how recently they have moved to the UK.

Limitations aside, the research has highlighted a number of important influences upon the maternal child feeding styles and beliefs of South Asian mothers living in the UK. It shows how closely maternal child feeding style is associated with wider cultural and traditional beliefs and presents a challenge for those working in practice to tackle the impact of some of these behaviours upon child weight and eating behaviour in a culturally sensitive and appropriate way.

Chapter 6

General Discussion

This thesis set out to examine why differences in childhood obesity between ethnic groups highlighted in the National Child Measurement Programme in the UK (DH, 2011; 2013; 2015; 2017a) may be occurring. In a series of three connected studies it firstly explored health and social care practitioners' views as to why children living in the UK from Black and South Asian backgrounds are more likely to be overweight compared to White British children, with children from Chinese backgrounds having the lowest risk. These findings suggested that differences in maternal influences may play out in a different way between ethnic groups and given the sparsity of data exploring this in the UK, a quantitative study sought to measure differences in maternal perceptions, child feeding interactions and own eating behaviours between mothers from different ethnic groups. The findings of this highlighted in particular a high use of pressurising, emotional and instrumental feeding styles amongst South Asian mothers, and focus groups were used in study three to explore these in more depth.

Given established data showing that non responsive feeding styles such as pressure to eat, instrumental and emotional feeding behaviour can affect both child eating behaviour and weight (Benton, 2004; Ventura & Birch, 2008), the findings are important not only for those working in child nutrition research, but practically for those working to support families in the community. Overall the results showed that mothers from South Asian backgrounds are more likely to use emotional and pressurising feeding styles, but this is deeply embedded within culture, traditional and social networks. The importance of considering how interventions can be developed in a culturally sensitive way is essential.

The literature review identified that although there are many known factors associated with childhood obesity, research into how these risks may differ between ethnic groups is often lacking depth or missing altogether. Much of the research that does consider ethnicity has taken place in the USA, where population breakdown in terms of ethnic groups and percentage of the population is vastly different to the UK.

In particular, the review highlighted that although maternal influences (such as her perceptions of weight, maternal child-feeding style, and own eating behaviour) are associated with child weight and eating behaviour, the bulk of the research that has considered differences in these between ethnic groups has been conducted in the USA. A clear gap emerged for UK specific research on this theme.

6.1 Study One

Based on this, study one set out to explore the views of health and social care professional across the UK who had experience working with diverse ethnic families, around what factors might be contributing to the differences in the National Child Measurement Programme findings. Broad, open questions were asked to allow participants to talk about their experiences and views, rather than to lead participants into agreeing with the gap identified in the literature review. The online data collection approached helped ensure that this distance was maintained.

The results highlighted that participants believed a number of complex influences were at play, that fitted well with each level of the Ecological systems theory approach to understanding behaviour (Bronfenbrenner, 1977; 1986; 1998). This included influences at the individual child level (such as body composition, genetics and diet), influences at the microsystem level such as family and peer influences, broader systems level factors at the exosystem level such as socioeconomic status, and finally suggestions around macrosystem level such as broader culture.

Some of the themes that participants raised had already been considered in research, including in UK contexts. For example, participants highlighted the importance of genetics and body composition being different between groups with a tendency for Black and South Asian children to naturally be more overweight. This fits with findings that show that Black and South Asian families are at a higher genetic risk for overweight (Rees et al., 2011; Shinozaki & Okuda, 2012; Wing et al., 2009). It also reflects on findings that show that although children from Black backgrounds are more likely to be rated as overweight, their body fat percentage is in fact lower, suggesting more muscular body compositions, whilst South Asian individuals are more likely to have higher body fat (Nightingale et al., 2011; Viner et al., 2010).

Participants also raised the idea that differences between ethnic groups in diet and physical activity levels may be affecting weight. Broadly, intake of excess calories, fat and soft drinks have been shown to be higher amongst Black and South Asian groups, whilst intake of fruit and vegetables is lower, compared to White groups (Donin et al., 2010; Harding, Teyhan, Maynard, & Cruickshank, 2008). Research also shows that activity levels are lower among children of minority ethnic groups – in particular South Asian and Black groups compared to White Caucasian children in the UK (Falconer et al., 2014; Owen et al., 2009a).

Attention was also drawn to wider socioeconomic and neighbourhood factors, stating that differences may well be down to the established link between obesity and poverty (Conrad & Capewell, 2012; Simkiss, 2014; Smith, Craig, Raja, McNeill & Turner, 2013; Stamatakis, Wardle & Cole, 2010) rather than any other differences between groups. This fits well with research in the UK that shows that ethnic minority groups are more likely to live in poverty (Barnard & Turner, 2011; Palmer & Kenway, 2007; Platt, 2007), and that deprivation has a greater effect on the risk of obesity for children from ethnic minority groups living in more deprived areas (Cronberg et al., 2010).

Finally, participants raised a number of influences around maternal beliefs around child weight, maternal own eating behaviours and maternal interactions with her children. Health professionals suggested that cultural influences on the role of food in showing love, may be important, embedded in wider pressurising parenting styles. Indeed, a wide body of research has established associations between maternal perceptions and behaviours and child weight and eating behaviour (Blissett, Haycraft, & Farrow, 2010; Brann & Skinner, 2005; Liem, Mars & De Graaf, 2004; Rodgers et al., 2013a; Webber, Hill, Cooke, Carnell & Wardle, 2010). However, although research has explored differences in maternal child feeding styles and preferences between ethnic groups in the USA (Hughes et al., 2005; 2006; Spruijt-Metz et al., 2002; Ventura, Gromis & Lohse, 2010), little has been conducted in the UK, despite its recognised importance.

Here in the UK, just three studies have explored the maternal feeding styles in terms of differences between ethnic groups; firstly, a recent study in preschool children

showed that mothers from Black African-Caribbean and South Asian groups were more likely to engage in pressurising, emotional and instrumental feeding compared to White Caucasian mothers (Gu, Warkentin, Mais, & Carnell, 2017). Secondly, another study conducted in Bradford amongst Pakistani mothers revealed that South Asian Pakistani mothers were more likely to use authoritarian feeding styles with their children in comparison to White mothers. This authoritarian parenting style is normally associated with pressure to eat with high control and low warmth from parents (Fairley et al., 2015). Thirdly, Blissett & Bennett (2013) showed that Black African-Caribbean parents were more likely to use higher levels of restriction feeding styles compared with both White British and White German parents.

Alongside these three key studies, one further study explored how culture, religion and family norms can play a role in child feeding behaviour specifically amongst South Asian communities in the UK. Although this study did not explore differences between ethnic groups, it offers an important contribution by highlighting the use of pressurising and emotional feeding styles amongst South Asian mothers in the UK (Pallan, Parry & Adab, 2012).

The aim of this second research study was to therefore explore this research gap by understanding how maternal influences, in particular maternal child feeding may differ between ethnic groups in the UK.

6.2 Study two

Study two used established tools of perceived and preferred child body silhouettes (Truby & Paxton, 2002), measures of maternal child-feeding style (Birch et al., 2001; Wardle, Guthrie, Sanderson, Rapoport, & Plomin, 2002) and maternal own eating behaviour (Stunkard & Messick, 1985) to compare differences in maternal perceptions, attitudes, beliefs and behaviours between the four main ethnic groups in the UK identified in the UK Child Measurement Programme: White British, South Asian, Black and Chinese.

A number of patterns emerged from the data, but a particular highlight was two clusters of perceptions and behaviours around child feeding style and own eating behaviour for South Asian and Chinese mothers. Mothers from South Asian

backgrounds reported using higher levels of pressure to eat, indulgent feeding and emotional feeding compared to other groups, whilst also reporting higher levels of own emotional eating behaviour (coupled with lower restraint). Chinese mothers reflected the opposite pattern. They used both high levels of restriction with their children and higher levels of restrained eating themselves.

These patterns supported limited data in the UK collected with mothers of preschool children, that mothers from South Asian backgrounds are more likely to use higher levels of pressure to eat with their children (Gu, Warkentin, Mais, & Carnell, 2017). It also supported findings from the USA where Chinese mothers report using high levels of restriction as a method to prevent their children from adopting perceived unhealthy Western diets (Wehrly et al., 2014). More broadly, it added to literature in the USA showing variation in maternal feeding style between ethnic groups (Pai & Contento, 2014), although as noted throughout this thesis research is typically not conducted with patterns of ethnicity seen in the UK. The findings from study two therefore highlighted the need for more research exploring how ethnicity might affect child's diet and eating behaviour in the UK.

6.3 Study three

Finally, study three built on the findings in study two specifically in relation to understanding why levels of pressure to eat, emotional eating and indulgent feeding, and own emotional eating behaviour, were high amongst South Asian mothers. A decision was made to focus on this pattern due to the need to understand why higher levels of overweight and obesity are occurring amongst South Asian children in the UK.

The findings in this study highlighted how maternal feeding interactions amongst South Asian mothers were complex, and deeply embedded within cultural and social norms. A key finding was that the act of preparing, sharing and eating food was tied to notions of identity as part of South Asian culture and as a good mother. Food was about celebration and love, and sent a message to others, rather than simply being about diet. Tradition was central, with long established foods and methods of food preparation. Straying from these traditions would be interpreted as a spur to others.

This fits with previous research that shows how strongly food can be tied to identity in South Asian families (Maiter & George, 2003). Food is part of being social and maintaining ties with family (Lawton et al., 2008). Preparing and sharing traditional meals brings family together and helps maintain cultural identity (Pallan, Parry & Adab, 2012). Ritual occasions are embedded in South Asian culture with serving traditional food full of calories and related to identity (Mukherjea, Underwood, Stewart, Ivery & Kanaya, 2013). Food identity in South Asian culture is an integral part of the culture in terms of defining a particular group with shared values, beliefs, knowledge, habits and customs (Stajcic, 2013). Constructing ethnicity is seen to be in line with food identity and belonging in South Asian culture (Vallianatos & Raine, 2008).

The central role of family was also highlighted, with a particular influence of grandmothers upon what children ate and how foods were prepared. Power hierarchies were clear, with mothers feeling that they could not over rule the advice or behaviour of their mother or other family members. This reflects previous findings that elder family members always provide family support and guidance with strong attached to mothers, particularly around mothering styles and around eating food in the house (Cooley & Unger, 1991). Mothers often received guidance and support with regard to child feeding from their mothers-in-law (Thomas & Avery, 1997). Family interactions with grandparents in South Asian families make up a major part of relationships that are perceived as highly valuable for a child's diet and feeding (Kurrien & Vo, 2004).

6.4 Bringing the findings together

Brought together, the findings from the three studies highlight that differences in maternal perceptions of child weight, child feeding interactions, and own eating behaviour do differ between ethnic groups in the UK. This is the first body of work to explore these patterns in the UK in school age children, supporting two other UK studies that have highlighted pressurising feeding styles amongst South Asian mothers with preschool children (Fairley et al., 2015; Gu, Warkentin, Mais, & Carnell, 2017). These findings are important given our understanding of the potential influence of maternal perceptions and preferences for child weight, their feeding

style and own eating behaviour upon child weight and eating behaviour (Benton, 2004; Ventura & Birch, 2008).

For example, as noted previously, maternal preference for a larger child is associated with increased risk of overweight (Ceballos & Czyzewska, 2010; Sosa, Mckyer, Goodson & Castillo, 2014), in part due to increased likelihood of encouraging the child to eat (Scaglioni, Arrizza, Vacchi & Tedeschi, 2011). Maternal child feeding interactions can also affect child weight and eating behaviour. Pressure to eat has been associated with a breakdown in a child's ability to regulate their appetite (Harris et al., 2014), leading to increased weight over time (Stang & Loth, 2011). Traditional South Asian foods are often high in calories and energy (Chowdhury, Helman, & Greenhalgh, 2000) thus pressurising children to over consume these foods may lead to additional risk of overweight.

Meanwhile, using emotional feeding styles is associated with an increased risk of emotional eating in children (Rodgers et al., 2013a; Tan & Holub, 2015). Mothers who are emotional eaters themselves are more likely to use emotional feeding styles with their daughters, increasing their daughters risk of emotional eating (Lauzon-Guillain, et al., 2009). As a consequence children of emotional eaters/ feeders are more likely to eat in the absence of hunger (Jansen et al., 2018; Morrison et al., 2013) and be overweight (Hajna, Leblanc & Faight, 2014).

6.4.1 What about children from Black and Chinese backgrounds?

Although a clear pattern was seen in an increase in pressurising, indulgent and emotional feeding styles and own eating behaviour for mothers from South Asian backgrounds, which may contribute towards established differences in child obesity, the data from Black and Chinese mothers did not fit so neatly into established theory.

Although mothers from Black backgrounds were more likely to perceive their child as larger, and also prefer a larger sized child when compared to white British mothers, they did not report high levels of non-responsive feeding styles or own uncontrolled eating behaviour as the mothers from South Asian backgrounds did. There are a number of reasons for this. Firstly, any differences in child weight may simply be genetic / related to body composition rather than any interactions a mother

has with her child. Research has shown that genetic factors may cause increased weight gain either from influences affecting energy intake or impact on food preferences (O’Rahilly & Farooqi, 2006). Limited research findings from the USA demonstrated ethnic differences in genetic susceptibility that affect weight, showing African Americans to be at higher risk of obesity due to genetic makeup compared to White Americans (Cossrow & Falkner, 2004; Wing et al., 2009).

However, the distribution of fat also differs between White Americans and Black Americans, with Black Americans having lower body fat and less abdominal fat at any BMI (Conway et al., 1995; Hill et al., 1999). Similarly, in the UK, compared to South Asian children, Black African Caribbean children having lower adiposity and body fat, are similar to White at any BMI (Nightingale et al., 2011; Shaw et al., 2007). This finding is crucial because it may affect the number of those who are perceived as overweight children, whilst, in fact, they do not have excess body fat (Deurenberg, 2001). In particular, research has previously identified the lower risk of being rated as overweight among Black men and women because of their lower body fat, in general (Abell et al., 2008; Sanchez et al., 2000; Stevens et al., 1998).

This means that although children from Black backgrounds may be larger in size and considered overweight by BMI, it does not necessarily mean that they are ‘over fat’. Mothers may therefore be selecting a child silhouette that represents their child’s body shape rather than showing preference for a child with greater fat mass. This is an important consideration to make when giving advice or designing interventions around child weight amongst UK Black populations and was raised by practitioners in study one. Participants specifically talked about children from Black backgrounds having a different body composition but tended to refer to social and cultural practices when discussing children from South Asian backgrounds. Further research is needed. In particular it would be interesting to know how maternal child feeding style might interact with genetic differences between groups – if children from Black backgrounds (with a lower genetic risk) are exposed to high levels of control does it affect them in the same way as children from South Asian backgrounds (with a higher genetic risk)?

Secondly, although in the USA mothers from Black backgrounds were more likely to use controlling feeding styles (Evan et al., 2011), it is difficult to draw direct inference between all 'Black' groups. Black African-Caribbeans in the US and Black British groups have different backgrounds, heritage and histories; a long and difficult history exists in the US, with Black populations used for slavery and with little economic protection for their families (Reeves & Woods- Giscombé, 2015). Comparatively, Black populations in the UK originated mainly from former colonies and from the West Indies in the 1950s and 1960s. A Black African Caribbean ancestral origin is the result of migration via sub-Saharan Africa or the Caribbean islands (Agyemang, Bhopal, & Bruijnzeels, 2005). Potentially some of the restrictive and pressurising behaviours seen amongst Black African-Caribbean mothers in the USA may be tied to poverty, deprivation and stress. It would be a useful avenue for future research to explore maternal feeding practices in these two populations.

Finally, although 40 mothers from Black backgrounds were included in the sample, caution must be taken from extrapolating too much from this small sample. Further research may wish to explore issues within a larger group of participants, including intra group differences.

Mothers from Chinese backgrounds reported high levels of restrictive feeding practices and were themselves restrictive eaters – two characteristics that have been associated with child eating in the absence of hunger (Carnell, Benson, Driggin & Kolbe, 2014; Jansen, Mulken, Emond, & Jansen, 2008; Kral & Rauh, 2010; Rollins, Loken, Savage & Birch, 2013), and in some cases child overweight (Faith & Kerns, 2005; Jansen et al., 2014; Lewis & Worobey, 2011; Webber, Hill, Cooke, Carnell & Wardle, 2010) in other samples. Yet, in the Child Measurement Programme, children from Chinese backgrounds were less likely to be overweight and in this thesis were perceived as more likely to be underweight by practitioners, with mothers identifying and preferring a smaller silhouette for their children. There are a number of possibilities for why restrictive practices may not be leading to overweight amongst Chinese children.

Firstly, genetic risk of overweight may be lower in the Chinese population compared to other groups. Associations between the fat-mass obesity associated gene (FTO)

and obesity traits have been tested in Chinese subjects and found a negative relationship compared to those of European descent (Chang et al., 2008; Li et al., 2008). In addition, for the same BMI Chinese individuals have lower body fat compared to other ethnicities, particularly South Asian groups who have the highest body fat (Wulan, Westerterp & Plasqui, 2010).

Secondly, research with preschool children has shown that a high level of restriction can be effective as they have little opportunity to overeat as they are not in control of their own food choices (Farrow & Blissett, 2008). The impact emerges later when children have more opportunities – in schools, at parties and eventually the freedom to buy their own snacks. Given in the current sample and in previous research (Pai & Contento, 2014), parents from Chinese backgrounds are more likely to be controlling in their parenting style, giving children less freedom, then potentially parallels could be drawn. Children from Chinese backgrounds may simply get less opportunity to overeat and remain less likely to be overweight compared to their peers. Research with adolescents and young adults (when freedom would be greater) to see the long term effects of this would be interesting. However, there is also the possibility that the research on the impact on child feeding style is culturally specific, and therefore biased towards white populations. We cannot assume that conclusions from data collected with White children and parents applies to those from different ethnic and cultural groups.

For example, looking to the parenting styles research, a number of papers have questioned the blanket approach that authoritarian parenting is ‘bad’ for children leaving them with worse outcomes than authoritative styles. Most of the early parenting research, at least from a UK perspective has the same White bias as the childhood obesity literature. For example, Chao (1994) explains how, compared to European Americans, Chinese parents show more control and authoritarian parenting, with greater scores for ‘training’ as a concept of teaching appropriate behaviour that involved a context of a supportive parent-child relationship. However, the strictness of Chinese parenting reflects a Confucian idea, a child-centred emphasis on the importance of training (guan) or ‘to govern’ instead of a punitive approach which characterises and reflects authoritarian parents’ attitudes. Therefore

a controlling feeding style may be protective or beneficial within Chinese communities.

Illustrating this, in one study whilst authoritative parenting approaches had the best school outcomes for American and Australian adolescents, Chinese adolescents whose parents adopted an authoritarian approach had even better grades comparatively (Leung, Lau & Lam, 1998). Likewise, in another study in Beijing, authoritarian parenting was associated with improved academic achievement compared to an authoritative parenting approach (Chen, Dog & Zhou, 1997).

6.4.2 Implications for public health

A number of potential interventions and priorities have emerged from the data for public health practitioners to consider. More broadly, and reflecting findings in previous research, interventions may wish to explore ways to highlight healthy child weight (rather than preferred child weight as a larger silhouette). Increasing physical activity may be another important area. Specifically, interventions may wish to develop ways to help mothers to reduce their use of food as reward or as a bribe to change or control behaviour. Wider parenting interventions to highlight alternate positive interactions may be relevant here.

However, this research also uncovered two specific novel areas where interventions may wish to effectively focus. One of the key observations from study three was that mothers often referred to the concept of Western foods being unhealthy and that these foods should be restricted or avoided. Notably however, no mother raised the idea that traditional foods could be unhealthy (or unhealthy in large amounts). Education may wish to focus on how this issue could be explored amongst South Asian families.

A second area of interest was how South Asian mothers were keen for their children to try new traditional foods, and to eat a large proportion of these in their diet. However, they discussed how children often disliked these foods, leading mothers to pressurise them to eat them. Looking at the wider literature, pressurising a child to eat a disliked or unfamiliar food can have the impact of them further refusing, and inevitably eating less of the consumed food (Farrow, Galloway & Fraser, 2008;

Galloway et al., 2006; Montgomery, Jackson, Kelly & Reilly, 2006). Conversely, positive encouragement to eat, and modelling, has been associated with increased intake (Addessi, Galloway, Visalberghi & Birch, 2005; Cooke, Wardle, Gibson, Sapochnik, Sheiham & Lawson, 2004; Galloway, Fiorito, Lee & Birch, 2005). Working with families to help them understand this association, and to adopt more positive feeding interactions, may help desired increase continuity of traditional foods.

6.5 Ensuring interventions are culturally relevant

Taken together, the research therefore has several conclusions that will be important for those working in both research in this area, but those in practice developing interventions and supporting families in the community. However it also highlights the complexity of the issue. Culture is a major influence upon behaviour, including health choices. Although on the one hand the potential gap here to develop interventions to reduce pressurising, emotional and indulgent feeding behaviours amongst South Asian families is clear, this must be conducted in a culturally sensitive way for both respect and the likelihood of having an impact.

Public health interventions to support healthy eating and weight gain in families are common (Campbell & Hesketh, 2007; Mikkelsen, Husby, Skov & Perez-Cueto, 2014; Sacher et al., 2010) but can often fail to work if they do not take into consideration wider social and cultural factors that affect participation and uptake (Booth et al., 2001; Carroll, Ali, & Azam, 2002; Wilson, 2009). As noted above, Bronfenbrenner's Ecological Systems Theory (Bronfenbrenner, 1977; 1986; 1998) shows how complex behaviour is, and how it is affected by many different layers of influence, from closer levels of family and friends, through wider societal issues such as socioeconomic status, to the broadest cultural level. Interventions that simply target the individual without considering the wider influences around them are unlikely to work. This is particularly true when not taking into account cultural differences.

Process evaluations for example will always consider public health behaviours as complex, working to understand the different influences (and the interactions between these influences) upon behaviour. The Medical Research Council highlight

how interventions need to be understood in terms of causal mechanisms and contextual factors, rather than simply looking at outcomes alone. Understanding what these mechanisms are – and what is important in ensuring interventions work – is vital especially when trying to understand what works in specific populations, particularly if transferring information learned from one population to another (Moore et al., 2013).

Interventions therefore work best when they target different layers of influence on an individual. The Health Belief Model (HBM) (Rosenstock, 1974) helps illustrate how a number of factors influence whether an individual will choose to undertake a behaviour. These include perceived severity of health issues, perceived susceptibility to the health issue, perceived benefits of making a change and perceived barriers to making a change. A number of factors will interact with these including self-efficacy, cues to action (e.g. a trigger to act) (Rosenstock, Strecher, & Becker, 1988) and modifying variables such as age, gender and ethnicity (Lee, Arthur & Avis, 2008; Marlow, Waller, Evans & Wardle, 2009; Orji, Vassileva & Mandryk, 2012; Romano & Scott, 2014).

For example, the HBM has predicted in a number of studies whether an individual will adopt healthy eating or weight recommendations. It has been used to explore participants weight related attitudes, the perceived threat of these and adverse consequences if changes do not occur (Daddario, 2007). It has also been used to develop a variety of health-related behaviours and motivations for healthy eating among college students in terms of the perceived severity and efficacy of eating healthfully (Deshpande, Basil, & Basil, 2009). For example, using the Health Belief Model, Lambert et al. (2005) report that overweight and obese postpartum women in the women, infants and children program are more likely to change their behaviour if they believed that their current behaviour puts them at risk of negative health consequences, and that benefits when making the recommended behaviour changes override the barriers they may encounter when trying.

The strongest interventions may therefore tackle factors at different or all of these levels e.g. increasing understanding of how an individual is susceptible, raising awareness of the benefits of acting, or increasing self-efficacy. However to do this,

these interventions must be relevant and appealing within a wider cultural context. They must be acceptable, relevant and achievable within the wider cultural norms, pressures and practices of South Asian culture, rather than simply applying generalised interventions that have typically been developed and tested on white populations (Truong, Paradies & Priest, 2014).

For example, if an intervention tries to raise perceived susceptibility to obesity related ill health, how does that fit with cultural norms that a larger body is a size of health and prosperity (Eckstein et al., 2006; Lindsay et al., 2011; Pasch et al., 2016; Trigwell, Watson, Murphy, Stratton, & Cable, 2013)? How does reducing intake of calorie dense food compete with extremely strong norms and pressures for traditional food to be at the heart of celebrations (Lawton et al., 2008)? Or how does an intervention to highlight the benefits of a healthy diet fit within a culture that benefits from social connection and feelings of shared identity tied to food (Kumanyika, 2008)? Patel et al. (2012) state that understanding cultural beliefs and practices is vital in implementing effective interventions particularly when it comes to challenging aspects such as dietary changes and physical activity behaviour.

However, as with all theories on human behaviour, the Health Belief Model (HBM) has limitations. First, it examines attitudes toward risk-related beliefs rather than emotional reactions, which may be a better predictor of behaviour. Negative emotions such as fear are an essential part of health-related behaviour, accompanied by a high state of arousal (Fiske, Gilbert & Lindzey, 2010). Second, the relationship between perceived risk and perceived severity in relation to forming a threat is not always clear. Perceived severity is required to be in a heightened state before perceived susceptibility becomes a stronger predictor (Champion & Skinner, 1997).

Another principal weakness of HBM is that this model does not explicitly describe the relationships between the variables, and no clear guidance exists for combining the variables (Orji, Vassileva & Mandryk, 2012). However, this aspect can also be viewed as a benefit, allowing more flexibility in adapting the model and making it relevant to different health behaviour and population groups. Others have criticised the model for often using small effect sizes for primary variables (susceptibility,

severity, benefits and barriers) (Abraham & Sheeran, 2005). Thus, the model is incomplete, despite its high adoption rate by health-behaviour promotion scientists.

A further initial criticism was the model's lack of consideration of self-efficacy. The model assumed that attitudes and beliefs would drive a behaviour if it is considered important enough. However, self-efficacy does not always relate to attitude in this way. An individual can have low self-efficacy, yet feel significant concern. In other words, they may very much want to change, but feel unable to do so. To respond to this limitation, Rosenstock et al. (1988) extended the HBM with a cue to action and self-efficacy, which widely improved the model's predictive power.

An alternative model through which to consider the findings might be McLeroy et al.'s (1988) Socio-Ecological Model (SEM), a comprehensive model that integrates multiple levels of influence to understand health behaviour and outcomes. It considers five major levels of influence: intrapersonal factors, interpersonal processes and primary groups, institutional factors, community factors and public policy. Figure 4 demonstrates the five SEM levels of influence (McLeroy et al., 1988).

Socio-Ecological Model

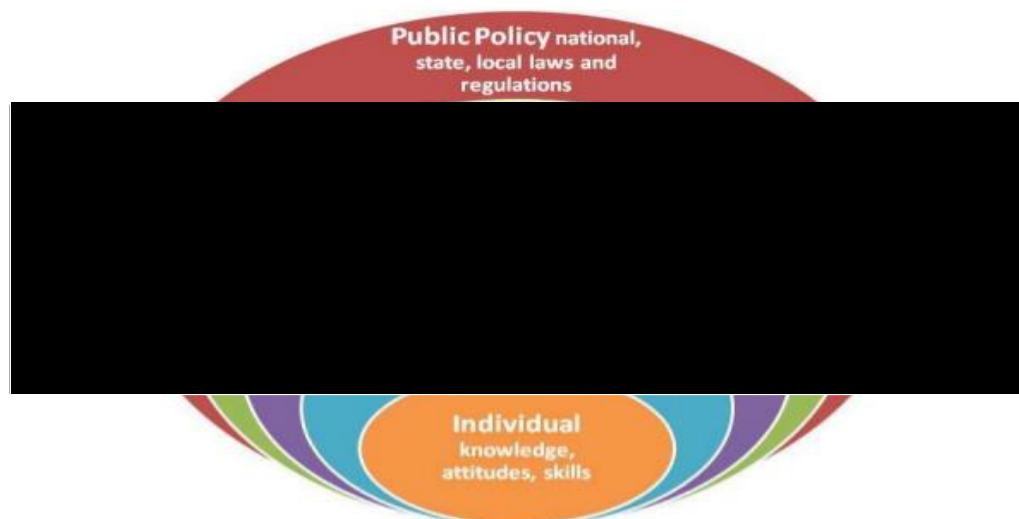


Figure 4: Socio-Ecological Model: A theory-based model of SEM demonstrates how interventions promotion programmes target specific layer in order to make it work;
source: adapted from Freeman (2017)

Table 26: A socio-ecological perspective: levels of influence

Levels of influence	Description
Intrapersonal	Individual characteristics that influence behaviour, such as knowledge, attitudes, beliefs, and personality traits
Interpersonal	Interpersonal processes, and primary groups including family, friends, peers, that provide social identity, support and role definition
Organizational	Rules, regulation, policies, and informal structures, which may constrain or promote recommended behaviours
Community	Social networks and norms, or standards, which exist as formal or informal among individuals, groups, and organization
Public policy	Local, state, federal policies and laws that regulate or support healthy actions and practices for disease prevention, early detection, control, and management

The SEM highlights how any intervention to improve health behaviours and outcomes must consider factors at each of these different levels. The most successful interventions typically address more than one level, particularly focussing on the wider levels surrounding the individual, rather than focussing on the individual alone. The model recognises that social resources and influences at each of these levels exert an important impact on individual behaviour; therefore, targeting these layers for intervention can be more successful than targeting the individual (McLeroy et al., 1988).

SEM has been used in studies targeting changing maternal child-feeding interactions in particular ethnic groups, although these studies typically have been conducted among US populations. For example, in one study examining obesity prevention in Native American children, a home-visiting intervention programme was developed focusing on providing education and enhanced parenting support. The programme tackled responsive parenting and feeding, with a particular emphasis on encouraging broader responsive parenting skills. The intervention was associated with reduced feeding-control practices and a positive trend toward reducing overweight. However, it did use a small sample size, relatively short intervention delivery and no long-term follow-up (Harvey-Berino & Rourke, 2003).

In a randomised, controlled, trial intervention aiming to reduce obesity and chronic disease risk in low-income, multi-ethnic, postpartum women, an intervention was developed to test the efficacy of the educational model delivered by community-based paraprofessionals. The model encourages institutional change to support behavioural change, influencing intrapersonal and interpersonal levels, with Hispanics comprising the majority of trial participants. The intervention was related to improved diet and physical activity. Despite the effect on behaviours, it can lead to the individual feeling overwhelmed (Peterson, Sorensen, Pearson, Hebert, Gottlieb & McCormick, 2002).

Understanding the cultural contexts of South Asian cultural communities has a beneficial effect on developing childhood obesity prevention interventions. A key element of South Asian culture is a focus on family and cohesion. As noted previously, attitudes and knowledge of family members, particularly elder members,

are highly valued – often over the knowledge and recommendations of health professionals (Cooley & Unger, 1991; Kurrien & Vo, 2004; Lucas, Murray & Kinra, 2013; Thomas & Avery, 1997). The dominant culture is also collectivist, based on shared knowledge and beliefs about what is best for the group rather than the individual (Basu-Zharku, 2011; Jackson & Nesbitt, 1993; Shariff, 2009; Uskul, 2010). Interventions to improve outcomes that simply focus on the individual are therefore unlikely to succeed.

Instead, using a family based or community focussed intervention can have far more success amongst South Asian communities as it works with collectivist groups rather than individuals alone (Lucas, Murray & Kinra, 2013). As noted in the findings, grandmothers and extended family have considerable influence. Extended family members (grandparents) in a South Asian context may be concerned about an underweight child and this may act as an influential control around child feeding (Pallan, Parry & Adab, 2012). Therefore interventions that also aim to change the attitudes and beliefs of families as a whole are more likely to be successful.

Interventions must also work with cultural norms, particularly around diet and activity. One study for example exploring perceptions around increasing physical activity amongst South Asian women found that a common perception was that taking time and energy to exercise was selfish. Day to day activities such as housework and care giving were to be prioritised and used up sufficient exercise. ‘Wasting’ energy on physical activity was seen as selfish and unnecessary (Sriskantharajah & Kai, 2006). Another study found that women from South Asian backgrounds were anxious – or discouraged by family – from undertaking physical activity outside alone (Cross-Bardell, George, Bhoday, Tuomainen, Qureshi & Kai, 2015).

In terms of understanding weight loss and preferences to do so, one study with Latino obese adults found that messages around weight loss were conflicting with cultural views around a heavier weight being seen as attractive (Diaz, Mainous & Pope, 2006), whilst one study with African American women found a tendency for individuals to believe weight was largely driven by genetics and outside of their control (James et al., 2012).

Individuals from ethnic minority groups who are given dietary or activity information that goes against their dominant culture and traditions may feel that they are abandoning their roots, particularly if social and cultural symbolism of food is removed. Challenges may also arise when introducing new foods – that differ in taste, preparation or style of eating. Differing cost and accessibility may also be an issue (James, 2004). Understanding that traditional South Asian foods are high in fat and energy is often high, but pressures from others to continue traditions can outweigh this (Cross-Bardell et al., 2015).

Wider considerations such as the language that an intervention (or its materials are delivered in), or the ethnicity of the individual delivering the intervention are also important. Cultural sensitivity can be enhanced by translating materials into different languages and presenting them in a format that is recognised to the individual (Lindberg & Stevens, 2007). Overall interventions must understand and work alongside this information if they are going to work.

Examples that are culturally relevant

Looking to the literature to understand what interventions have been developed successfully for South Asian populations, in a culturally relevant way, a number can be identified. For example, one school based intervention recognised that a barrier to girls participating in physical activity was mixed gender sessions. Developing girls only sessions increased the number of South Asian girls participating in school based physical activity sessions (Brown, Smith, Bhopal, Kasim & Summerbell, 2015).

Another study aiming to identify cultural and contextual influences on childhood obesity in South Asian communities to better target interventions highlighted the central role of religious practices. To increase physical activity in South Asian children, it must be understood that removing barriers is vital because children typically were attending a mosque when extra physical-activity sessions were arranged. Therefore, changing the timing and incorporating activities into the school day helped enhance uptake. Thinking about suitable clothing and giving children more freedom to wear clothes considered suitable from a cultural perspective also increased participation (Pallan, Parry & Adab, 2012).

Interventions that work outside the individual and focus on family relations also work well. For example, one intervention carried out in Bristol with South Asian families in order to increase exclusive breastfeeding rates worked with grandmothers rather than mothers alone. It recognised that grandmothers often had significant influence over their daughter's feeding behaviours and by targeting education at the grandmothers, it increased the likelihood that their daughter's gave colostrum to their babies (Ingram, Johnson, & Hamid, 2003).

Another study chose the Sikh temple as the venue to implement intervention in a South Asian community in the UK for promoting behaviour change and awareness of diabetes concern. The project showed effective changes in the respondents' and their families' diet and lifestyle in relation to food and eating (Coe & Boardman, 2008). The prevention of diabetes and obesity in South Asians in a family- and home-based study has shown effective weight loss and increased physical activity in individuals of the South Asian population living in the UK (Bhopal et al., 2014). These RCTs were conducted for 3 years and involved 15 visits from a dietician. Reductions in BMI and waist and hip circumferences were significantly observed in the intervention group.

6.6 Study limitation

This research examined previously unexplored areas of the literature around differences in childhood obesity by ethnic groups in the UK. The findings gathered explanations of why differences in childhood obesity that have been shown in the NCMP between ethnic groups exist in the UK (DH, 2011; 2013; 2015; 2017a). Results of studies one to three completed each other, suggesting common influences among Asian parents in the UK related to maternal child-feeding style, parenting attitudes and behaviours associated with the culture and parental perception of child weight. The research did have limitations as presented more broadly below.

Research sampling

The research was examining a new area, attempting to investigate the contributing factors in the UK context. Given the lack of research on ethnic minority groups in the UK around the increase in childhood obesity, and thus, the researcher set out to fill

the gap in research while simultaneously testing the assumptions in the initial research. All research studies one, two and three used the self-selecting method.

The disadvantage of initial research was the self-selecting of participants. Only highly interested participants in child weight differences by ethnic groups were allowed to take part; those who emailed and responded, and those who possessed sufficient working knowledge of computers were invited via an email. However, it was possible in this point as the potential to gain ideas for further research in this area. Snowball sampling reduced this limitation as participants encourage sharing the questionnaire link, using also study advert placed in social media for professional to take part.

All studies were self-selecting, meaning that only highly interested individuals may have participated in the study. In particular, as is often the case in behavioural research, although variation was evident across the research, participants' average education level was higher than the population's average, which means the findings may be biased toward those with a higher level of education. Future research should aim to recruit a more diverse sample in terms of education level to help determine whether behaviours and concerns differed among different educational groups. However, education level was controlled for throughout the analyses.

Second, the focus group in the third study took part in the non-ethnically diverse city, having the chance of bringing close-relation participants together in the study. The number of focus group members was lower, but this created greater opportunity for participants to fully discuss and interact which enriching data on relevant content. Another limitation of study three was that it was conducted in a small sampling of participants from the Asian ethnic group. However, future research would be useful to test demographic influence on larger sample size and in a more ethnically diverse city in the UK.

The decision not to include child weight is a limitation of the study. Having the child's weight measured or identified by the parents as overweight or not may alter the data. However, weighing the participants is time consuming, difficult and costly. This method of assessing children's weight status requires measurements on a scale

and involves well-trained professionals to undertake the measurements for objectivity. Also, self-reports can be inaccurate, and the focus of this study was on perceptions, beliefs and behaviour, not on actual weight.

Recruitment

Recruitment for study two used an element of internet method. It has been criticised due to being biased as only educated participants can take part (Azar, 2000). However, the vast majority of internet users have increased universally with even small devices having internet access. Around 89% of adults in the UK had access to the internet in 2017, range from 99% - 97% in those aged 16 – 54 (ONS, 2017). It also has been increasingly popular in social sciences research to study incredibly large respondent populations. It possible that non-serious responses may emerge, nonetheless, this may decline due to the large sample of participants (Buchanan, 2000).

The initial study used an open-ended questionnaire designed based on the exploratory purpose. Data was collected at one point and did not allow any follow-up questions, so less pressure was on the participants because of busy timescale for those professionals at work. However, professionals presented many responses around the psycho-social factors that influenced childhood obesity which may explain differences in the NCMP.

Tools used: the challenge of cross-cultural research

Other limitations in the research concern those brought up by the challenge of conducting research across a number of ethnic groups, with different cultural values and backgrounds to consider. The first core challenge is that of what language to use for the research, especially when time and monetary restraints are involved, such as for a PhD thesis. Ideally, tools and procedures would be generated in each participant's first language by researchers who speak that language and understand that culture. However, that introduces significant time and expense, as well as new researchers, raising consistency issues (Halai, 2007).

Translation across languages also is tricky. Certain terms or phrases may not be understood or directly translate (Hanna, Hunt & Bhopal, 2006). In addition, using a

translator to convey the significance of a phrase unintentionally could change the meaning (Culley, Hudson & Rapport, 2007). These all can affect rigour. However, if such steps are not taken, it can affect recruitment and inclusion (Hanrahan et al., 2015), and, as the objectives of this thesis identified, ethnic minority groups often are underrepresented in research. It is understandable—if research objectives, tools and researchers do not meet participants' needs—why would individuals want to participate (Quay et al., 2017).

However, time and monetary constraints required that the research be conducted in English. Although the tools selected for use in the questionnaire were established measures of child weight, parental feeding style and eating behaviour, these tools primarily were developed using predominantly white samples. Although the child-feeding questionnaire has been translated and validated into languages that include French and Chinese (e.g., Liu, Mallan, Mahrshahi, & Daniels, 2014; Monnery-Patris et al., 2011), no validated version of the tools exists for South Asian dialects.

Furthermore, all tools were in the English language only, meaning that only those who spoke English could complete them. This likely exacerbated the issue of the generally higher level of education seen in the sample and would skew the findings to those who could speak English. Ideally, the tools would have been available in numerous different languages, with data collected by those with expertise in individual participants' languages. However, as noted earlier, time and monetary constraints made such steps unattainable for this project, but future research should consider how different tools or methods of data collection can be designed to be more culturally appropriate and include those whose first language is not English.

Importance of measuring acculturation and enculturation to the UK

Data were collected on country of birth, language used at home and time spent living in the UK to explore, to some extent, whether degree of acculturation/enculturation affected maternal attitudes and behaviours. These measures commonly are used as a proxy measure of acculturation in quantitative research and often show high internal consistency with longer, more complex measures of acculturation (Cruz et al., 2008). The language spoken at home is considered to be one of the strongest predictors of

acculturation (Arcia, Skinner, Bailey & Correa, 2001), with country of birth also a good predictor (Alegria et al., 2007).

However, these tools are rather crude, as they do not measure the true definition of acculturation (how much an individual has adapted to a country's norms, lifestyle and attitudes) or enculturation (how strongly elements of native cultural values are preserved) (Otero-Sabogal, Sabogal, Perez-Stable & Hiatt, 1995). In other words, they may identify high or low acculturation, but they do not explain the underlying mechanisms.

Tools are available to measure acculturation more fully from an attitudinal perspective, but it was decided that they entailed the addition of too many extra questions to an already lengthy questionnaire, especially given how different scales might have been needed for each ethnic group included (Alegria, 2009; Salant & Lauderdale, 2003). Much of the research that examined these measures again draws on ethnic groups outside the UK, particularly US Latino and Hispanic populations (e.g., the review by Thomson & Hoffman-Getz, 2009). Again, the issue of generalisability arises, a complex issue and one that future research should address.

Classification of ethnicity

The research raised difficulties in using the term 'ethnicity' as it seems an over-generalisation of the participants that involve biased. Ethnicity dimensions include several categories like colour, national identity, citizenship, religion, language, country of birth and culture. People of the similar ethnicities are perceived to share characteristics including social background, cultural traditions, language, religion, and geographical and ancestral origins (Bhopal, 2007). The study used a set of classification identified earlier in chapter three. Self-assigned identification by the individuals appears to be the most appropriate technique for measuring race or ethnicity (Bradby, 2003; Friedman et al., 2000).

However, this identification does not necessarily measure the perception of how others identify that specific group identity (Hahn, Truman & Barker, 1996), and predefined categories have a limited selection and sometimes might not be accurately identifying the dominant categories of group identity (Bartlett & Fiander, 1995).

Grouping of ethnic categories hides the massive heterogeneity within a group that diminishes the ethnical value categorisation with regards to delivering appropriate cultural health care, and in comprehending the aetiology of ethnic variations in disease. Broad categories might not fit with the self-identity of ethnic minority groups (Bhopal, 2004). The use of the term ‘ethnicity’ as a means of categorisation can be another manifestation of the dominant culture that marginalises different ethnic groups (Spencer, 2014, p. 58).

Of course, the participants could also come from mixed ethnicity families; the present study focused on the mothers’ ethnicity. A fixed categorisation of ethnicity, as in a mixed ethnic group, can fail to capture the rich expressions of multiple group affiliations and identities, resulting in the marginalisation of identification to categories, such as ‘mixed’ and ‘others’ (Bradby, 2003), describing a mixed category to all to those who are not ‘pure’ may connotations of racialised notions of miscegenation. Some ambiguous designations may also reflect the complexity of ethnicity. Further research may wish to explore the differences between families of mixed race, in which the parents are of different ethnicities.

6.7 Future directions

A number of trajectories for further research have originated from the data findings. It can be folded into three key areas; expansion of the current research findings, exploration of the further association between factors raised. Extending the research to a larger sample of ethnically diverse areas is valuable as it will help to examine the influence of wider demographic backgrounds on the findings. It would be wise to investigate more ethnically diverse areas to understand other Asian communities like Indians because variations exist between these groups (Bhopal, 2007).

In terms of exploration, testing the association between maternal behaviours in Asian mothers and level of assimilation to the UK among the first and second generations is important. Based on the findings, maternal child feeding styles and their own eating behaviours vary by the duration of living in the UK. To properly study links, we must understand the influence the amount of time lived in the UK has on mothers’ behaviours. Further research is needed to test the psychological factors on

immigrants' mothers or genetic differences as this may contribute to the behavioural changes in child feeding practices which impact children's weights.

6.8 Conclusions

The aim of this thesis was to explore why differences in childhood obesity by ethnic groups that are shown in National Child Measurement Programme in the UK (DH, 2011; 2013; 2015; 2017a) exist between ethnic groups in the UK. Maternal controlling feeding practices can have adverse influences on child weight status and eating behaviours (Benton, 2004; Ventura & Birch, 2008). This thesis also explored the different factors associated with the parental perception of child weight and the maternal child feeding styles amongst Asian mothers in the UK. Parents' child-feeding styles; pressurising, emotional and instrumental feeding were associated with the increase child overweight in the Asian ethnic group. Moreover, Asian mothers, in particular, are higher in emotional and uncontrolled eating behaviours and this may, in part, explain why these mothers used greater controlling feeding style (Wardle et al., 2002). This uncontrolled and emotional eating behaviour is linked to child overweight (Hajna, Leblanc & Faught, 2014) associated with the child's desire to eat (Morrison et al., 2013).

This thesis also provides evidence from Asian mothers in the UK that foods and dietary behaviours have been linked to Asian family identities which illuminate differences in maternal child feeding practices in the UK amongst other groups. Food is a central role in constructing cultural identity (Stajcic, 2013). It also allows for the maintenance of family togetherness, belonging and forming ethnicity (Nordström, Coff, Jönsson, Nordenfelt, & Görman, 2013; Vallianatos & Raine, 2008). However, behaviours associated with these cultural elements such as pressurising children to eat and using emotional feeding styles, can be putting children at an increased risk of eating in the absence of hunger and overweight (Ventura & Birch, 2008). If these patterns of maternal feeding styles and their eating behaviour tend to be stable among Asian families, associated with culture and traditions, intervention along with parental education in term of negative patterns of maternal perception, feeding, attitudes and behaviours could have a positive impact on child weight and eating in future is needed.

To conclude, the findings of this thesis have shown the importance of practice and health professionals developing culturally sensitive and appropriate practices to support ethnically diverse families in promoting healthy child weight. Interventions may need to be multi layered, considering influences of wider family members. Furthermore, critically, they must fit in with cultural values and long held traditions, finding a way to balance the importance of culture and belonging with encouraging healthy child eating behaviour and weight. These findings will be important for health workers and clinicians in practice to better support families and mothers in implementing healthful feeding practices and promoting healthy eating habits in their children.

References

- Abell, J.E., Egan, B.M., Wilson, P.W., Lipsitz, S., Woolson, R.F., & Lackland, D.T. (2008). Differences in Cardiovascular Disease Mortality Associated With Body Mass Between Black and White Persons. *American Journal of Public Health*, 98(1), 63-66.
- Aborigo, R.A., Moyer, C.A., Rominski, S., Adongo, P., Williams, J., & Logonia, G., Engmann, C. (2012). Infant nutrition in the first seven days of life in rural northern Ghana. *BMC Pregnancy and Childbirth*, 12(1), 76.
- Abraham, C., Sheeran, P. (2005). The health belief model. In: M. Conner & P. Norman (Eds.), *Predicting Health Behaviour: Research and Practice with Social Cognition Models* (2nd ed., pp. 28-80). Maidenhead: Open University Press.
- Adair, L.S., Fall, C.H., Osmond, C., Stein, A.D., Martorell, R., Ramirez-Zea, M., & Micklesfield, L. (2013). Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies. *The Lancet*, 382(9891), 525-534.
- Adams, E., Grummer-Strawn, L. & Chavez, G. (2003) Food insecurity is associated with increased risk of obesity in California women. *Journal of Nutrition*. 133, 1070–1074.
- Adessi E., Galloway A.T., Visalberghi E., & Birch, L.L. (2005). Specific social influences on the acceptance of novel foods in 2–5 year old children. *Appetite*, 45, 64–271.
- Agarwal, R., Virmani, D., Jaipal, M.L., Gupta, S., Gupta, N., Sankar, M.J., & Paul, V. K. (2012). Vitamin D Status of Low Birth Weight Infants in Delhi: A Comparative Study. *Journal of Tropical Pediatrics*, 58(6), 446-450.
- Agyemang, C., Bhopal, R., & Bruijnzeels, M. (2005). Negro, Black, Black African, African Caribbean, African American or what? Labelling African origin populations in the health arena in the 21st century. *Journal of Epidemiology & Community Health*, 59(12), 1014-1018.
- Ahmad, S., Waller, G., & Verduyn, C. (1994). Eating attitudes among Asian schoolgirls: The role of perceived parental control. *International Journal of Eating Disorders*, 15(1), 91-97.
- Ailhaud, G., Massiera, F., Weill, P., Legrand, P., Alessandri, J.M., & Guesnet, P. (2006). Temporal changes in dietary fats: Role of n–6 polyunsaturated fatty acids in excessive adipose tissue development and relationship to obesity. *Progress in Lipid Research*, 45(3), 203-236.
- Alegria, M. (2009). The challenge of acculturation measures: what are we missing? A commentary on Thomson & Hoffman-Goetz. *Social science & medicine*, 69 (7), 996-998.

- Alegria, M, Sribney, W, Woo M, Torres M, Guarnaccia P. (2007) Looking Beyond Nativity: The Relation of Age of Immigration, Length of Residence, and Birth Cohorts to the Risk of Onset of Psychiatric Disorders for Latinos. *Research in Human Development*, 4(1–2):19–47.
- Ali, S., & Frederickson, N. (2011). The parenting dimensions of British Pakistani and white mothers of primary school children. *Infant and Child Development*, 20(3), 313-329.
- Allen, M.L., Elliott, M.N., Morales, L.S., Diamant, A.L., Hambarsoomian, K., & Schuster, M.A. (2007). Adolescent participation in preventive health behaviors, physical activity, and nutrition: differences across immigrant generations for Asians and Latinos compared with Whites. *American Journal of Public Health*, 97(2), 337-343.
- Allender, S., & Rayner, M. (2007). The burden of overweight and obesity-related ill health in the UK. *Obesity Reviews*, 8(5), 467-473.
- Almerico, G.M. (2014). Food and identity: food studies, cultural and personal identity. *Journal of International Business and Cultural Studies*, 8, 1-7.
- Aloia, J.F., Vaswani, A., Mikhail, M., & Flaster, E.R. (1999). Body Composition by Dual-Energy X-ray Absorptiometry in Black Compared with White Women. *Osteoporosis International*, 10(2), 114-119.
- Anderson, S.E., & Whitaker, R.C. (2009). Prevalence of obesity among US preschool children in different racial and ethnic groups. *Archives of pediatrics & adolescent medicine*, 163(4), 344-348.
- Anderson, S.E., Economos, C.D., & Must, A. (2008). Active play and screen time in US children aged 4 to 11 years in relation to socio-demographic and weight status characteristics: a nationally representative cross-sectional analysis. *BMC Public Health*, 8, 366–372.
- Anderson, A.S., Bush, H., Lean, M., Bradby, H., Williams, R., & Lea, E. (2005). Evolution of atherogenic diets in South Asian and Italian women after migration to a higher risk region. *Journal of Human Nutrition and Dietetics*, 18(1), 33-43.
- Ang, R.P., & Goh, D.H. (2006). Authoritarian parenting style in Asian societies: A cluster-analytic investigation. *Contemporary Family Therapy*, 28(1), 131-151.
- Ang, Y. N., Wee, B. S., Poh, B. K., & Ismail, M. N. (2012). Multifactorial Influences of Childhood Obesity. *Current Obesity Reports*, 2(1), 10-22.
- Anzman, S. L., Rollins, B. Y., & Birch, L. L. (2010). Parental influence on children's early eating environments and obesity risk: implications for prevention. *International Journal of Obesity*, 34(7), 1116.

Arcia, E., Skinner, M., Bailey, D. and Correa, V. (2001) Models of acculturation and health behaviors among Latino immigrants to the US. *Social Science and Medicine*. 53 (1): 41-53.

Arenz, S., Rückerl, R., Koletzko, B., & von Kries, R. (2004). Breast-feeding and childhood obesity—a systematic review. *International journal obesity Related Metabolic Disorders*, 28(10), 1247-1256.

Armstrong, J., & Reilly, J. J. (2002). Breastfeeding and lowering the risk of childhood obesity. *The Lancet*, 359(9322), 2003-2004.

Arredondo, E.M., Elder, J.P., Ayala, G.X., Campbell, N., Baquero, B., & Duerksen, S. (2006). Is parenting style related to children's healthy eating and physical activity in Latino families?. *Health education research*, 21(6), 862-871.

Arshad, S. (2007). Ethnicity and attitudes to body shape. *Unpublished doctoral thesis*. Leeds. University of Leeds.

Ashcroft, J., Semmler, C., Carnell, S., Van Jaarsveld, C.H. M., & Wardle, J. (2008). Continuity and stability of eating behaviour traits in children. *European journal of clinical nutrition*, 62(8), 985.

Aspinall, P.J. (1997) The conceptual basis of ethnic group terminology and classification, *Social Science and Medicine*, 45, 5, 689–98.

Aspinall, P.J. (2002). Collective Terminology to Describe the Minority Ethnic Population. *Sociology*, 36(4), 803-816.

Aspinall, P.J. (2011). The utility and validity for public health of ethnicity categorization in the 1991, 2001 and 2011 British Censuses. *Public Health*, 125(10), 680-687.

Atkinson, P., Coffey, A., & Delamont, S. (2003c). Strangeness and Familiarity. In P. Atkinson, A. Coffey, & S. Delamont (Eds.), *Key Themes in Qualitative Research. Continuities and Change*. Oxford: AltaMira Press.

Aud, S., Fox, M.A., & KewalRamani, A. (2010). Status and trends in the education of racial and ethnic groups (NCES 2010-015). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Australian Bureau of Statistics (2015). National Health Survey: first results, Australian 2014-15. Australian Bureau of Statistics. Retrieved from [http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/CDA852A349B4CEE6CA257F150009FC53/\\$File/national%20health%20survey%20first%20results,%202014-15.pdf](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/CDA852A349B4CEE6CA257F150009FC53/$File/national%20health%20survey%20first%20results,%202014-15.pdf)

Aydin, S., Ozkan, Y., Erman, F., Gurates, B., Kilic, N., Colak, R., & Sahn, I. (2008). Presence of obestatin in breast milk: relationship among obestatin, ghrelin, and leptin in lactating women. *Nutrition*, 24(7), 689-693.

Azar, B. (2000). A web of research: They're fun, they're fast and they save money but do web experiments yield quality results? *Monitor on psychology*, 31, 42 – 47.

Babakus, W.S., & Thompson, J.L. (2012). Physical activity among South Asian women: A systematic, mixed-methods review. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 150.

Bacardí-Gascón, M., Díaz-Ramírez, G., Cruz López, B., López Zuñiga, E., & Jiménez-Cruz, A. (2013). TV food advertisements' effect on food consumption and adiposity among women and children in Mexico. *Nutricion Hospitalaria*, 28(6), 1900-1904.

Bacha, J.M., Appugliese, D., Coleman, S., Kaciroti, N., Bradley, R.H., Corwyn, R. F., & Lumeng, J.C. (2010). Maternal perception of neighborhood safety as a predictor of child weight status: The moderating effect of gender and assessment of potential mediators. *International Journal of Pediatric Obesity*, 5(1), 72-79.

Bair, Y.A., Gold, E.B., Greendale, G.A., Sternfeld, B., Adler, S.R., Azari, R., & Harkey, M. (2002). Ethnic Differences in Use of Complementary and Alternative Medicine at Midlife: Longitudinal Results From SWAN Participants. *American Journal of Public Health*, 92(11), 1832-1840.

Baird, J., Fisher, D., Lucas, P., Kleijnen, J., Roberts, H., & Law, C. (2005). Being big or growing fast: Systematic review of size and growth in infancy and later obesity. *BMJ*, 331(7522), 929.

Baker, C. (2015). Obesity Statistics (brief paper No. 3336). London: House of Commons Library.

Balantekin, K.N., Birch, L.L., & Savage, J.S. (2017). Eating in the absence of hunger during childhood predicts self-reported binge eating in adolescence. *Eating Behaviors*, 24, 7-10.

Ball, K., & Kenardy, J. (2002). Body weight, body image, and eating behaviours. *Eating Behaviors*, 3(3), 205-216.

Bansal, N., Ayoola, O.O., Gemmell, I., Vyas, A., Koudsi, A., Oldroyd, J., & Cruickshank, J.K. (2008). Effects of early growth on blood pressure of infants of British European and South Asian origin at one year of age: the Manchester children's growth and vascular health study. *Journal of Hypertension*, 26(3), 412-418.

Barbour, R. (1999). The case for combining qualitative and quantitative approaches in health services research, *Journal of Health Services Research & Policy*, 4, 39-43.

Barbour, R. (2007). *Doing focus groups*. London: Sage.

Barnard, H. & Turner, C. (2011). Poverty and Ethnicity, York: Joseph Rowntree Foundation.

Bartlett, A., & Fiander, M. (1995). Census categories of ethnic group are limited. *British Medical Journal*, 310, 332.

Bartok, C.J., & Ventura, A.K. (2009). Mechanisms underlying the association between breastfeeding and obesity. *Pediatric Obesity*, 4(4), 196-204.

Bas, M., & Donmez, S. (2009). Self-efficacy and restrained eating in relation to weight loss among overweight men and women in Turkey. *Applet*, 52(1), 209-216.

Basu-Zharku, I.O. (2011). Effects of collectivistic and individualistic cultures on imagination inflation in Eastern and Western cultures. *Student Pulse*, 3 (02), 1–5.

Baughcum, A.E., Burklow, K.A., Deeks, C.M., Powers, S.W., & Whitaker, R.C. (1998). Maternal Feeding Practices and Childhood Obesity. *Archives of Pediatrics & Adolescent Medicine*, 152(10), 1010-1014.

Baughcum, A.E., Chamberlin, C.M., Deeks, C.M., Powers, S.W., & Whitaker, R.C. (2000). Maternal perceptions of overweight preschool children. *Pediatrics*, 106, 1380–1386.

Baumrind, D. (1993). The average respectable environment is not good enough: A response to Scarr. *Child Development*, 64, 1299-1317.

Belcher, B.R., Berrigan, D., Dodd, K.W., Emken, B.A., Chih-Ping, C., and Spruijt-Metz, D. (2010). Physical activity in US youth: effect of race/ethnicity, age, gender, and weight status. *Med. Sci. Sports Exerc.* 42(12), 2211–2221.

Benton, D. (2004). Role of parents in the determination of the food preferences of children and the development of obesity. *International journal of obesity*, 28(7), 858-869.

Berentzen, T. L., Gamborg, M., Holst, C., Sørensen, T. I., & Baker, J. L. (2014). Body mass index in childhood and adult risk of primary liver cancer. *Journal of Hepatology*, 60(2), 325-330.

Berge, J.M. (2009). A review of familial correlates of child and adolescent obesity: what has the 21st century taught us so far?. *International journal of adolescent medicine and health*, 21(4), 457-484.

Berge, J.M., Wall, M., Loth, K., & Neumark-Sztainer, D. (2010). Parenting style as a predictor of adolescent weight and weight-related behaviors. *Journal of Adolescent Health*, 46(4), 331-338.

Bergmeier, H. J., Skouteris, H., Hetherington, M. M., Rodgers, R. F., Campbell, K. J., & Cox, R. (2017). Do maternal perceptions of child eating and feeding help to explain the disconnect between reported and observed feeding practices?: A follow-up study. *Maternal & Child Nutrition*, 13(4), e12420.

Berry, J.W. (2001), A psychology of immigration. *Journal of Social Issues*, 57(3), 615-631.

Berry, J.W. (2008). Globalization and acculturation. *International Journal of Intercultural Relations*, 32(4), 328–336.

Berry, J.W., Phinney, J. S., Sam, D. L., & Vedder, P. (2006). Immigrant youth: Acculturation, identity, and adaptation. *Applied psychology*, 55(3), 303-332.

Berthoud, R. (2000). Family formation in multi-cultural Britain: three patterns of diversity. Colchester: Institute for Social and Economic Research, University of Essex.

Bhopal, R.S. (2004). Glossary of terms relating to ethnicity and race: for reflection and debate. *J Epidemiol Community Health*, 58(6), 441-445.

Bhopal, R.S. (2007). Ethnicity, race, and health in multicultural societies. NY: Oxford University Press.

Bhopal, R.S., & Donaldson, L. (1998) White, European, western, Caucasian, or what? Inappropriate labelling in research on race, ethnicity and health. *American Journal of Public Health*, 88(9), 1303–1307.

Bhopal, R.S., Douglas, A., Wallia, S., Forbes, J.F., Lean, M.E., Gill, J.M., & Murray, G.D. (2014). Effect of a lifestyle intervention on weight change in south Asian individuals in the UK at high risk of type 2 diabetes: A family-cluster randomised controlled trial. *The Lancet Diabetes & Endocrinology*, 2(3), 218-227.

Biddle, S.J., Gorely, T., & Stensel, D.J. (2004). Health-enhancing physical activity and sedentary behaviour in children and adolescents. *Journal of Sports Sciences*, 22(8), 679-701.

Billson, J.M. (2006). The Power of Focus Groups: A Training Manual for Social and Policy Research: Focus on International Development. Barrington, RI: Skywood Press.

Birch, L.L., & Fisher, J. O. (2000). Mothers' child-feeding practices influence daughters' eating and weight. *American Journal of Clinical Nutrition*, 71(5), 1054-1061.

Birch, L. (1991). Obesity and eating disorders: A developmental perspective. *Bulletin of the Psychonomic Society*, 29, 265-272.

Birch, L.L. (1998). Psychological Influences on the Childhood Diet. *The Journal of Nutrition*, 128(2).

Birch, L.L., Fisher, J.O., & Davison, K.K. (2003). Learning to overeat: Maternal use of restrictive feeding practices promotes girls eating in the absence of hunger. *The American Journal of Clinical Nutrition*, 78(2), 215-220.

Birch, L.L., Fisher, J.O., Grimm-Thomas, K., Markey, C.N., Sawyer, R., & Johnson, S.L. (2001). Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite*, 36(3), 201-210.

Black, M.M., & Aboud, F.E. (2011). Responsive Feeding Is Embedded in a Theoretical Framework of Responsive Parenting1–3. *The Journal of Nutrition*, 141(3), 490-494.

Black, J.A., Park, M., Gregson, J., Falconer, C.L., White, B., Kessel, A.S., & Kinra, S. (2015). Child obesity cut-offs as derived from parental perceptions: cross-sectional questionnaire. *British Journal of General Practice*, 65(633).

Blissett, J., & Bennett, C. (2013). Cultural differences in parental feeding practices and children's eating behaviours and their relationships with child BMI: A comparison of black African-Caribbean, white British and white German samples. *European Journal of Clinical Nutrition*, 67, 180-184.

Blissett, J., & Haycraft, E. (2008). Are parenting style and controlling feeding practices related? *Appetite*, 50, 477 – 485.

Blissett, J., Haycraft, E., & Farrow, C. (2010). Inducing preschool children's emotional eating: relations with parental feeding practices. *The American journal of clinical nutrition*, 92(2), 359-365.

Blissett, J., Meyer, C., & Haycraft, E. (2006). Maternal and paternal controlling feeding practices with male and female children. *Appetite*, 47(2), 212-219.

Bolling, K., Grant, C., Hamlyn, B., & Thornton, A. (2007). The Infant Feeding Survey –2005. Health & Social Care Information Centre: Leeds, UK.

Bomberg, E., Birch, L., Endenburg, N., German, A., Neilson, J., Seligman, H., & Day, M. (2017). The Financial Costs, Behaviour and Psychology of Obesity: A One Health Analysis. *Journal of Comparative Pathology*, 156(4), 310-325.

Booth, S.L., Sallis, J.F., Ritenbaugh, C., Hill, J.O., Birch, L.L., Frank, L.D., & Hays, N.P. (2001). Environmental and Societal Factors Affect Food Choice and Physical Activity: Rationale, Influences, and Leverage Points. *Nutrition Reviews*, 59(3), S21–S39.

Boslaugh, S.E., Luke, D.A., Brownson, R.C., Naleid, K.A., & Kreuter, M.W. (2004). Perceptions of neighborhood environment for physical activity: Is it “who you are” or “where you live”? *Journal of Urban Health*, 81, 671-681.

Bouchard, C. (2009). Childhood obesity: are genetic differences involved? *The American Journal of Clinical Nutrition*, 89(5), 1494S-1501S.

Boutelle, K., Fulkerson, J. A., Neumark-Sztainer, D., & Story, M. (2004). Mothers' perceptions of their adolescents' weight status: Are they accurate. *Obesity Research*, 12, 1754–1757.

Bowring, A.L., Peeters, A., Freak-Poli, R., Lim, M.S., Gouillou, M., & Hellard, M. (2012). Measuring the accuracy of self-reported height and weight in a community-based sample of young people. *BMC Medical Research Methodology*, 12(1).

Bradby, H. (2003). Describing ethnicity in health research. *Ethnicity and Health*, 8(1), 5-13.

Braden, A., Rhee, K., Peterson, C.B., Rydell, S.A., Zucker, N., & Boutelle, K. (2014). Associations between child emotional eating and general parenting style, feeding practices, and parent psychopathology. *Appetite*, 80, 35-40.

Brann, L.S., & Skinner, J.D. (2005). More controlling child-feeding practices are found among parents of boys with an average body mass index compared with parents of boys with a high body mass index. *Journal of the American Dietetic Association*, 105, 1411 – 1416.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3, 77-101.

Braun, V. & Clarke, V. (2013). Successful qualitative research: A practical guide for beginners. London: Sage.

Brewis, A. (2011). Obesity: Cultural and biocultural perspectives. New Brunswick: Rutgers University Press.

Brion, M.J.A., Ness, A.R., Rogers, I., Emmett, P., Cribb, V., Smith, G.D., & Lawlor, D.A. (2010). Maternal macronutrient and energy intakes in pregnancy and offspring intake at 10 y: exploring parental comparisons and prenatal effects. *The American Journal of Clinical Nutrition*, 91(3), 748-756.

Brødsgaard, A., Wagner, L., Peitersen, B., Poulsen, I., & Sørensen, T.I. (2011). Maternal and child awareness and expectations of child overweight. *Obesity Facts*, 4, 297 -304.

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32, 513–531.

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: research perspectives. *Developmental Psychology*, 22,723-742.

Bronfenbrenner, U., & Morris, P. (1998). The ecology of developmental processes. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology: Theoretical models of human development* (5th ed., pp. 993–1028). New York: John Wiley & Sons.

Brown, A. (2015). Milk supply and breastfeeding decisions: the effects of new mothers' experiences. *NCT Perspectives*, 29.

Brown, P.J., & Konner, M. (2006). An Anthropological Perspective on Obesity. *Annals of the New York Academy of Sciences*, 499(1), 29-46.

- Brown, A., & Lee, M. (2012). Breastfeeding during the first year promotes satiety responsiveness in children aged 18-24 months. *Pediatric Obesity*, 7(5), 382-390.
- Brown, A., & Lee, M. (2013). Breastfeeding is associated with a maternal feeding style low in control from birth. *PloS one*, 8(1), e54229.
- Brown, A., & Lee, M.D. (2015). Early influences on child satiety-responsiveness: The role of weaning style. *Pediatric Obesity*, 10(1), 57-66.
- Brown, R. & Ogden, J. (2004). Childrens eating attitudes and behaviour: A study of the modelling and control theories of parental influence. *Health Education Research*, 19(3), 261-271.
- Brown, A., & Rowan, H. (2015). Maternal and infant factors associated with reasons for introducing solid foods. *Maternal & Child Nutrition*, 12(3), 500-515.
- Brown, A., Raynor, P., & Lee, M. (2011). Healthcare professionals' and mothers' perceptions of factors that influence decisions to breastfeed or formula feed infants: A comparative study. *Journal of Advanced Nursing*, 67(9), 1993-2003.
- Brown, T., Smith, S., Bhopal, R., Kasim, A., & Summerbell, C. (2015). Diet and Physical Activity Interventions to Prevent or Treat Obesity in South Asian Children and Adults: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*, 12(1), 566-594.
- Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*, 1, 8–22.
- Bryman, A. (2008). *Social Research Methods* (3rd ed.). Oxford: Oxford University Press.
- Buchanan, T. (2000). Potential of the internet for personality research. In M.H. Birnbaum (Eds.), *Psychological experiments on the Internet* (pp. 121 – 140). San Diego, CA: Academic Press.
- Buckingham, A., & Saunders, P. (2004). *The survey methods workbook: from design to analysis*. Cambridge: Polity press.
- Burgess, R.L., Anderson, E.S., Schellenbach, C.J., & Conger, R.D. (1981). A social-interactional approach to the study of abusive families. In J. P.Vincent (Ed.), *Advances in family intervention, assessment, and theory: An annual compilation of research* (Vol. 2, pp. 1–46). Greenwich, CT: JAI.
- Burton, J., Nandi, A., & Platt, L. (2010). Measuring ethnicity: challenges and opportunities for survey research. *Ethnic and Racial Studies*, 33(8), 1332-1349.
- Bush, H., Williams, R., Bradby, H., Anderson, A. & Lean, M. (1998). Family Hospitality and Ethnic Tradition among South Asian, Italian and General Population Women in the West of Scotland. *Sociology of Health and Illness*, 20(3), 351–80.

Cachelin, F.M., Rebeck, R.M., Chung, G.H., & Pelayo, E. (2002). Does ethnicity influence body-size preference? A comparison of body image and body size. *Obesity*, 10(3), 158-166.

Çalışır, H., & Karaçam, Z. (2011). The prevalence of overweight and obesity in primary schoolchildren and its correlation with sociodemographic factors in Aydin, Turkey. *International Journal of Nursing Practice*, 17(2), 166-173.

Calle, E.E., Rodriguez, C., Walker-Thurmond, K., & Thun, M.J. (2003). Overweight, obesity, and mortality from cancer in a prospectively studied cohort of U.S. adults. *N. Engl. J. Med.* 348, 1625–1638.

Campbell, K.J., & Hesketh, K.D. (2007). Strategies which aim to positively impact on weight, physical activity, diet and sedentary behaviours in children from zero to five years. A systematic review of the literature. *Obesity Reviews*, 8(4), 327-338.

Campbell K.J., Crawford D.A. & Hesketh K.D. (2007). Australian parents' views on their 5–6 year old children's food choices. *Health Promotion International*, 22, 11–18.

Campbell, K., Crawford, D., Jackson, M., Cashel, K., Worsley, A., Gibbons, K., & Birch, L.L. (2002). Family food environments of 5– 6-year-old-children: Does socioeconomic status make a difference?. *Asia Pacific journal of clinical nutrition*, 11(s3), S553-S561.

Caprio, S., Daniels, S.R., Drewnowski, A., Kaufman, F.R., Palinkas, L.A., Rosenbloom, A.L., & Schwimmer, J.B. (2008). Influence of Race, Ethnicity, and Culture on Childhood Obesity: Implications for Prevention and Treatment: A consensus statement of Shaping Americas Health and the Obesity Society. *Diabetes Care*, 31(11), 2211-2221.

Cardel, M., Willig, A.L., Dulin-Keita, A., Casazza, K., Beasley, T.M., & Fernández, J.R. (2012). Parental feeding practices and socioeconomic status are associated with child adiposity in a multi-ethnic sample of children. *Appetite*, 58(1), 347-353.

Carnell, S., & Wardle, J. (2008). Appetite and adiposity in children: evidence for a behavioral susceptibility theory of obesity. *The American journal of clinical nutrition*, 88(1), 22-29.

Carnell, S., Benson, L., Driggin, E., & Kolbe, L. (2014). Parent feeding behavior and child appetite: Associations depend on feeding style. *International Journal of Eating Disorders*, 47(7), 705-709.

Caroli, M., Argentieri, L., Cardone, M. & Masi, A. (2004) Nutrition and body weights of Canadian children watching television and eating while watching television. *Int J Obes Relat Metab Disord*, 28(3) S104-S108.

Carroll, R., Ali, N. & Azam, N. (2002). Promoting physical activity in South Asian Muslim women through exercise on prescription. *Health Technology Assessment*, 6, 1-108.

CASP. (2013). Critical Appraisal Skills Programme. Retrieved from http://media.wix.com/ugd/dded87_29c5b002d99342f788c6ac670e49f274.pdf

Castro, J.M., & Brewer, E. (1992). The amount eaten in meals by humans is a power function of the number of people present. *Physiology & Behavior*, 51(1), 121-125.

Catalano, P.M., & Ehrenberg, H.M. (2006). Review article: The short-and long-term implications of maternal obesity on the mother and her offspring. *BJOG: An International Journal of Obstetrics & Gynaecology*, 113(10), 1126-1133.

Ceballos, N., & Czyzewska, M. (2010). Body Image in Hispanic/Latino vs. European American Adolescents: Implications for Treatment and Prevention of Obesity in Underserved Populations. *Journal of Health Care for the Poor and Underserved*, 21(3), 823-838.

Chakkalakal, R.J., Gebretsadik, T., Jagasia, S., Shintani, A., & Elasy, T.A. (2015). Variation in the relationship between gestational diabetes diagnosis and total gestational weight gain by race/ethnicity. *Diabetes Research and Clinical Practice*, 108(1).

Chamberlain, L., Sherman, S., Jain, A., Powers, S., & Whitaker, R. (2002). "The challenge of preventing and treating obesity in low income preschool children" *Archive of Pediatric Adolescent Medicine*, 156, 662 – 668.

Chambers, J.C., Elliott, P., Scott, J., & Kooner, J.S. (2006). Physical Activity and Risk of Type 2 Diabetes in UK Indian Asian and Northern European Subjects in the London Life Sciences Population (LOLIPOP) Study. *Circulation*, 114(18), 894-895.

Chambers, J.C., Elliott, P., Zabaneh, D., Zhang, W., Li, Y., Froguel, P., & Kooner, J.S. (2008). Common genetic variation near MC4R is associated with waist circumference and insulin resistance. *Nature Genetics*, 40(6), 716-718.

Champion, V. L., & Skinner, C. S. (1997). The health belief model. In A. Baum, S. Newman, J. Weinman, R. West, C. McManus (Ed.), *Cambridge Handbook of Psychology, Health and Medicine* (pp. 45–65). Cambridge, UK: Cambridge University Press.

Chan, L., Magarey, A.M., & Daniels, L.A. (2010). Maternal Feeding Practices and Feeding Behaviors of Australian Children Aged 12–36 Months. *Maternal and Child Health Journal*, 15(8), 1363-1371.

Chang, Y., Liu, P., Lee, W., Chang, T., Jiang, Y., Li, H., & Chuang, L. (2008). Common Variation in the Fat Mass and Obesity-Associated (FTO) Gene Confers Risk of Obesity and Modulates BMI in the Chinese Population. *Diabetes*, 57(8), 2245-2252.

Chao, R.K. (1994). Beyond Parental Control and Authoritarian Parenting Style: Understanding Chinese Parenting Through the Cultural Notion of Training. *Child Development*, 65(4), 1111.

- Chao, R.K. (2000). The parenting of immigrant Chinese and European American mothers: Relations between parenting styles, socialization goals, and parental practices. *Journal of Applied Developmental Psychology*, 21(2), 233-248.
- Chao, R.K. (2001). Extending Research on the Consequences of Parenting Style for Chinese Americans and European Americans. *Child Development*, 72(6), 1832-1843.
- Chaparro, M.P., Langellier, B.A., Kim, L.P., & Whaley, S.E. (2011). Predictors of accurate maternal perception of their preschool child's weight status among Hispanic WIC participants. *Obesity*, 19(10), 2026–2030.
- Chauhan, U. (2008) Improving access to health care for minority ethnic populations with diabetes and heart disease. Unpublished doctoral thesis. Manchester. University of Manchester.
- Chen, J.L., & Kennedy, C. (2004). Family functioning, parenting style, and Chinese children's weight status. *Journal of Family Nursing*, 10(2), 262-279.
- Chen, X., Dong, Q., & Zhou, H. (1997). Authoritative and Authoritarian Parenting Practices and Social and School Performance in Chinese Children. *International Journal of Behavioral Development*, 21(4), 855-873.
- Chin, V.W., & Noor, N.M. (2014) Sociocultural determinants of health and illness: A theoretical inquiry. *Geografia : Malaysian Journal of Society and Space*, 10 (1), 49-59.
- Chiu, L.H. (1987). Childrearing attitudes of Chinese, Chinese-American, and Anglo-American mothers. *Journal of Social Psychology*, 128, 411–413.
- Choudhry, K., & Wallace, L.M. (2012). 'Breast is not always best': South Asian women's experiences of infant feeding in the UK within an acculturation framework. *Maternal & Child Nutrition*, 8(1), 72-87.
- Chowdhury, A.M., Helman, C., & Greenhalgh, T. (2000). Food beliefs and practices among British Bangladeshis with diabetes: implications for health education. *Anthropology & Medicine*, 7, 209-226.
- Chowdhury, S., Ammari, F., Burden, A.C., & Gregory, R. (2000). Secular trend in birth weight in native White and immigrant South Asian populations in Leicester, UK: Possible implications for incidence of type 2 diabetes in the future. *Practical Diabetes International*, 17(4), 104-108.
- Christenson, J.D., & Gutierrez, D.M. (2016). Using Qualitative, Quantitative, and Mixed Methods Research to Promote Family Therapy with Adolescents in Residential Settings. *Contemporary Family Therapy*, 38(1), 52-61.
- Chu, S.Y., Callaghan, W.M., Bish, C.L., & D'Angelo, D. (2009). Gestational weight gain by body mass index among US women delivering live births, 2004-2005: fueling future obesity, *American journal of obstetrics and gynecology*, 200(3), 271-e1.

- Clark, T., Sleath, B., & Rubin, R.H. (2004). Influence of ethnicity and language concordance on physician–patient agreement about recommended changes in patient health behavior. *Patient Education and Counseling*, 53(1), 87-93.
- Clark, H., Goyder, E., Bissell, P., Blank, L., & Peters, J. (2007). How do parents child feeding behaviours influence child weight? Implications for childhood obesity policy. *Journal of Public Health*, 29, 132 – 141.
- Coe, C., & Boardman, S. (2008). ‘From temple to table: an innovative community health and lifestyle intervention aimed at a South Asian community.’ *Ethnicity and Inequalities in Health and Social Care*, 1(2), 44-51.
- Cohen, A.K., Rai, M., Rehkopf, D.H., & Abrams, B. (2013). Educational attainment and obesity: A systematic review. *Obesity Reviews*, 14(12), 989-1005.
- Cole, T.J., Freeman, J.V., & Preece, M.A. (1995). Body mass index reference curves for the UK, 1990. *Archives of Disease in Childhood*, 73, 25-29.
- Cole, T.J., Bellizzi, M.C., Flegal, K.M., & Dietz, W.H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey, 1240–1243.
- Condon, L., & Mcclean, S. (2016). Maintaining pre-school childrens health and wellbeing in the UK: a qualitative study of the views of migrant parents. *Journal of Public Health*, 1-9.
- Conger, R.D., McCarty, J.A., Yang, R.K., Lahey, B.B., & Kropp, J.P. (1984). Perception of child, child-rearing values, and emotional distress as mediating links between environmental stressors and observed maternal behavior. *Child Development*, 55, 2234–2247.
- Connelly, R. (2011). Drivers of unhealthy weight in childhood: analysis of the Millennium Cohort Study. Edinburgh. Scottish Government.
- Conrad, D., & Capewell, S. (2012). Associations between deprivation and rates of childhood overweight and obesity in England, 2007-2010: An ecological study. *BMJ Open*, 2(2), 1-6.
- Conway, J.M., Yanovski, S.Z., Avila, N.A., & Hubbard, V.S. (1995). Visceral adipose tissue differences in black and white women. *The American Journal of Clinical Nutrition*, 61(4), 765-771.
- Cook, W.K., Tseng, W., Tam, C., John, I., & Lui, C. (2017). Ethnic-group socioeconomic status as an indicator of community-level disadvantage: a study of overweight/obesity in Asian American adolescents. *Soc Sci Med*, 184, 15–22.
- Cooke, L., & Fildes, A. (2011). The impact of flavour exposure in utero and during milk feeding on food acceptance at weaning and beyond. *Appetite*, 57(3), 808-811.

Cooke, L.J., Wardle, J., Gibson, E., Sapochnik, M., Sheiham, A., & Lawson, M. (2004). Demographic, familial and trait predictors of fruit and vegetable consumption by pre-school children. *Public Health Nutrition*, 7(02).

Cooley, M. L., & Unger, D. G. (1991). The role of family support in determining developmental outcomes in children of teen mothers. *Child Psychiatry and Human Development*, 21, 217-234.

Cornette R. (2011). The Emotional Impact of Obesity on Children. In D. Bagchi (Eds.). *Global Perspectives on Childhood Obesity: Current Status, Consequences and Prevention* (pp.257-264), Academic Press, Elsevier.

Creswell, J.W. (2009). Research design: qualitative, quantitative, and mixed methods approaches (3rd ed.). Los Angeles: Sage publications.

Creswell, J.W., & Clark, V.L.P. (2007). Designing and conducting mixed methods research, Thousand Oaks, CA: Sage publications.

Cronberg, A., Wild, H.M., Fitzpatrick, J., & Jacobson, B. (2010). Causes of childhood obesity in London: diversity or poverty. London: London Health Observatory.

Cross-Bardell, L., George, T., Bhoday, M., Tuomainen, H., Qureshi, N., & Kai, J. (2015). Perspectives on enhancing physical activity and diet for health promotion among at-risk urban UK South Asian communities: a qualitative study. *BMJ Open*, 5(2).

Cruz, T. H., Marshall, S. W., Bowling, J. M., & Villaveces, A. (2008). The Validity of a Proxy Acculturation Scale Among U.S. Hispanics. *Hispanic Journal of Behavioral Sciences*, 30(4), 425-446.

Cullen, K.W., Baranowski, T., Klesges, L.M., Watson, K., Sherwood, N.E., Story, M., & Pratt, C. (2004). Anthropometric, Parental, and Psychosocial Correlates of Dietary Intake of African-American Girls. *Obesity Research*, 12(S9).

Cullen, K.W., Baranowski, T., Owens, E., Marsh, T., Rittenberry, L., & de Moor, C. (2003). Availability, accessibility, and preferences for fruit, 100% fruit juice, and vegetables influence children's dietary behavior. *Health Education & Behavior*, 30(5), 615-626.

Culley, L., Hudson, N., & Rapport, F. (2007). Using Focus Groups With Minority Ethnic Communities: Researching Infertility in British South Asian Communities. *Qualitative Health Research*, 17(1), 102-112.

Cummins, L.H., Simmons, A.M., & Zane, N.W. (2005). Eating disorders in Asian populations: a critique of current approaches to the study of culture, ethnicity, and eating disorders. *American Journal of Orthopsychiatry*, 75(4), 553.

Cutting, T.M., Fisher, J.O., Grimm-Thomas, K., & Birch, L.L. (1999). Like mother, like daughter: familial patterns of overweight are mediated by mothers dietary disinhibition. *American Journal of Clinical Nutrition*, 69, 608 – 13.

Daddario, D. (2007). A review of the use of the health belief model for weight management. *Medsurg Nursing*, 16(6), 363-366.

D'Angelo, S., Crozier, S.R., Chittaranjan, Y., Joglekar, C., Lubree, H., Fall, C.H., & Inskip, H.M. (2015). Body Size and Body Composition: A Comparison between Children in India and in the UK through Infancy and Early Childhood. *Journal of Epidemiology and Community Health*, 67(1).

Daniels, S.R. (2006). The consequences of childhood overweight and obesity. *Future of Children*, 16(1), 47–67.

Daniels, S.R. (2009). Complications of obesity in children and adolescents. *International Journal of Obesity*, 33(S1).

Daniels, S.R., Loggie, J.M., Khoury, P., & Kimball, T.R. (1998). Left ventricular geometry and severe left ventricular hypertrophy in children and adolescents with essential hypertension. *Circulation*, 97(19), 1907-1911.

Darling, N. (2007). Ecological systems theory: The person in the center of the circles. *Research in Human Development*, 4, (3-4), 203-217.

Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin*, 113 (3), 487-496.

Darling, A.L., Hart, K.H., Macdonald, H.M., Horton, K., Kang'Ombe, A.R., Berry, J.L., & Lanham-New, S.A. (2012). Vitamin D deficiency in UK South Asian Women of childbearing age: a comparative longitudinal investigation with UK Caucasian women. *Osteoporosis International*, 24(2), 477-488.

Davison, K.K., & Birch, L.L. (2001). Childhood overweight: a contextual model and recommendations for future research. *Obesity reviews*, 2(3), 159-171.

Davison, K.K., Cutting, T.M., & Birch, L.L. (2003). Parents' activity-related practices predict girls' physical activity. *Medicine & Science in Sports & Exercise*, 35(9), 1589-1595.

Day F.R., & Loos R.J. (2011). Developments in obesity genetics in the era of genome-wide association studies. *J Nutrigenet Nutrigenomics*, 4, 222–238.

de Castro, J.M. (1993). Genetic influences on daily intake and meal patterns of humans. *Physiology & Behavior*, 53(4), 777-782.

De Hoog, M.L., Stronks, K., Van Eijsden, M., Gemke, R.J., & Vrijkotte, T.G. (2012). Ethnic differences in maternal underestimation of offspring's weight: the ABCD study. *International Journal of Obesity*, 36(1), 53-60.

De Lauzon, B., Romon, M., Deschamps, V., Lafay, L., Borys, J.M., Karlsson, J., & Charles, M.A. (2004). The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. *The Journal of nutrition*, 134(9), 2372-2380.

De Lauzon-Guillain B, Musher-Eizenman D, Leporc E, Holub S, & Charles MA. (2009). Parental feeding practices in the United States and in France: Relationships with child's characteristics and parent's eating behavior. *Journal of the American Dietetic Association*, 109, 1064-1069.

Dearing, E., McCartney, K., & Taylor, B.A. (2006). Within-child associations between family income and externalizing and internalizing problems. *Developmental Psychology*, 42(2), 237-252.

Deckelbaum, R.J., & Williams, C.L. (2001). Childhood obesity: The health issue. *Obesity Research*, 9(4), 239S–243S.

Delva, J., Johnston, L.D., & O'Malley, P.M. (2007). The epidemiology of overweight and related lifestyle behaviors: racial/ethnic and socioeconomic status differences among American youth. *American journal of preventive medicine*, 33(4), S178-S186.

Demerath, E.W., Schubert, C.M., Maynard, L.M., Sun, S.S., Chumlea, W.C., Pickoff, A., & Siervogel, R.M. (2006). Do changes in body mass index percentile reflect changes in body composition in children? Data from the Fels Longitudinal Study. *Pediatrics*, 117(3), e487-e495.

Department of Health (2008). Healthy Weight, Healthy Lives. Consumer Insight Summary, London: Department of Health. Retrieved from <http://lx.iriss.org.uk/sites/default/files/resources/Healthy.pdf>

Department of Health (2011). National Children Measurement Programme: England, 2010/11 school year. National Health Service Digital. Retrieved from <https://digital.nhs.uk/search?q=national+child+measurement+programme&s=s>

Department of Health (2013). National Children Measurement Programme: England, 2012/13 school year. National Health Service Digital. Retrieved from <https://digital.nhs.uk/search?q=national+child+measurement+programme&s=s>

Department of Health (2015). National Child Measurement programme: England, 2014/15 school year, National Health Service Digital. Retrieved from <https://digital.nhs.uk/search?q=national+child+measurement+programme&s=s>

Department of Health (2017a). National Children Measurement Programme: England, 2016/17 school year. National Health Service Digital. Retrieved from <https://digital.nhs.uk/catalogue/PUB30113>

Department of Health (2017b). Statistics on obesity, Physical Activity and Diet: England: 2017. National Health Service Digital. Retrieved from <https://www.gov.uk/government/statistics/statistics-on-obesity-physical-activity-and-diet-england-2017>

Deshpande, S., Basil, M., & Basil, D. (2009). Factors influencing healthy eating habits among college students: An application of the health belief model. *Health Marketing Quarterly*, 26(2), 145-164.

Desmet, K., Ortuño-Ortín, I., & Wacziarg, R. (2016). Culture, ethnicity and diversity. National Bureau of Economic Research Working Papers, w20989.

Deurenberg, P. (2001) Universal cut-off BMI points for obesity are not appropriate. *The British Journal of Nutrition*, 85(2), 135-136.

Deurenberg, P., Deurenberg-Yap, M., & Guricci, S. (2002). Asians are different from Caucasians and from each other in their body mass index/body fat per cent relationship. *Obesity Reviews*, 3(3), 141-146.

Dhawan, S. (1995). Birth weights of infants of first generation Asian women in Britain compared with second generation Asian women. *Bmj*, 311(6997), 86-88.

Diaz, V.A., Mainous, A.G., & Pope, C. (2006). Cultural conflicts in the weight loss experience of overweight Latinos. *International Journal of Obesity*, 31(2), 328-333.

Diaz Ramirez, G., Jiménez-Cruz, A., de las Cruces Souto-Gallardo, M., & Bacardí-Gascón, M. (2013). Effect of the Exposure to TV Food Advertisements on the Consumption of Foods by Mothers and Children. *Journal of pediatric gastroenterology and nutrition*, 56(1), 86-88.

Dixon, B., Peña, M.M., & Taveras, E.M. (2012), Lifecourse approach to racial/ethnic disparities in childhood obesity, *Advances in Nutrition: An International Review Journal*, 3(1), 73-82.

Donin, A.S., Nightingale, C.M., Owen, C.G., Rudnicka, A.R., McNamara, M.C., Prynne, C.J., & Whincup, P.H. (2010). Nutritional composition of the diets of South Asian, black African-Caribbean and white European children in the United Kingdom: the Child Heart and Health Study in England (CHASE). *British journal of nutrition*, 104(02), 276-285.

Dovey, T.M., Staples, P.A., Gibson, E.L., & Halford, J.C.G. (2008). Food neophobia and picky/fussy' eating in children: A review. *Appetite*, 50, 181-193.

Dubois, L., & Girard, M. (2006). Early determinants of overweight at 4.5 years in a population-based longitudinal study. *International journal of obesity*, 30(4), 610-617.

Duke, R.E., Bryson, S., Lawrence, D., Hammer, W. & Agras, S. (2004). The relationship between parental factors at infancy and parent reported control over children's eating at age 7. *Appetite*, 43, 247 – 252.

- Duncan, M. J., Birch, S., Al-Nakeeb, Y., & Nevill, A. M. (2012). Ambulatory physical activity levels of white and South Asian children in Central England. *Acta Paediatrica*, 101(4).
- Duncan, M. J., Woodfield, L., Al-Nakeeb, Y., & Nevill, A. M. (2008). Differences in Physical Activity Levels between White and South Asian Children in the United Kingdom. *Pediatric Exercise Science*, 20(3), 285-291.
- Ebbeling, C. B., Pawlak, D. B., & Ludwig, D. S. (2002). Childhood obesity: Public health crisis, common sense cure. *The Lancet*, 360(9331), 473-482.
- Eckstein, K.C., Mikhail, L.M., Ariza, A.J., Thomson, J.S., Millard, S.C., & Binns H.J. (2006). Parents' perceptions of their child's weight and health. *Pediatrics*, 117, 681-690.
- Eicher-Miller, H., Fulgoni, V., & Keast, D. (2015). Processed Food Contributions to Energy and Nutrient Intake Differ among US Children by Race/Ethnicity. *Nutrients*, 7(12), 10076-10088.
- Eliasi, J.R. & Dwyer, J.T. (2002). Kosher and Halal: religious observances affecting dietary intakes. *Journal of the American Dietetic Association*, 102(7); 911-13.
- El-Sayed, A. M., Scarborough, P., & Galea, S. (2011). Ethnic inequalities in obesity among children and adults in the UK: A systematic review of the literature. *Obesity Reviews*, 12(5), e516-e534.
- Evans, A., Seth, J. G., Smith, S., Harris, K. K., Loyo, J., Spaulding, C., Gottlieb, N. (2011). Parental Feeding Practices and Concerns Related to Child Underweight, Picky Eating, and Using Food to Calm Differ According to Ethnicity/Race, Acculturation, and Income. *Maternal and Child Health Journal*, 15(7), 899-909.
- Eyler, A.E., Wilcox, S., Matson-Koffman, D., Evenson, K.R., Sanderson, B., Thompson, J., Rohm-Young, D. (2002). Correlates of Physical Activity among Women from Diverse Racial/Ethnic Groups. *Journal of Womens Health & Gender-Based Medicine*, 11(3), 239-253.
- Fairley, L., Santorelli, G., Lawlor, D. A., Bryant, M., Bhopal, R., Petherick, E. S., Wright, J. (2015). The relationship between early life modifiable risk factors for childhood obesity, ethnicity and body mass index at age 3 years: findings from the Born in Bradford birth cohort study. *BMC Obesity*, 2(1).
- Faith, M.S., & Kerns, J. (2005). Infant and child feeding practices and childhood overweight: the role of restriction. *Maternal and Child Nutrition*, 1, 164-168.
- Faith, M.S., Scanlon, K.S., Birch, L.L., Francis, L.A., & Sherry, B. (2004). Parent-Child Feeding Strategies and Their Relationships to Child Eating and Weight Status. *Obesity Research*, 12(11), 1711-1722.

- Falciglia, G.A., & Norton, P.A. (1994). Evidence for a genetic influence on preference for some foods. *Journal of the American Dietetic Association*, 94(2), 154-158.
- Falconer, C.L., Park, M.H., Croker, H., Kessel, A.S., Saxena, S., Viner, R.M., & Kinra, S. (2014). Can the relationship between ethnicity and obesity-related behaviours among school-aged children be explained by deprivation? A cross-sectional study. *BMJ open*, 4(1), e003949.
- Farajian, P., Panagiotakos, D.B., Risvas, G., Karasouli, K., Bountziouka, V., Voutzourakis, N., & Zampelas, A. (2013). Socio-economic and demographic determinants of childhood obesity prevalence in Greece: the GRECO (Greek Childhood Obesity) study. *Public health nutrition*, 16(02), 240-247.
- Farrow, C., & Blissett, J. (2005). Maternal Psychopathology and Obesigenic Feeding Practices. *Obesity Research*, 13 (11), 1999-2005.
- Farrow, C., & Blissett, J. (2006). Does maternal control during feeding moderate early infant weight gain? *Pediatrics*, 118, 293–298.
- Farrow, C., & Blissett, J. (2008). Controlling Feeding Practices: Cause or Consequence of early child weight? *Pediatrics*, 121, 1–6.
- Farrow, C.V., & Blissett, J.B. (2009). Do obsessive compulsive symptoms mediate the relationship between maternal eating psychopathology and restrictive feeding practices. *International Journal of eating Disorders*, 46, 76 – 80.
- Farrow, C.V., Galloway, A.T., & Fraser, K. (2009). Sibling eating behaviours and differential child feeding practices reported by parents. *Appetite*, 52, 307 – 312.
- Felton, G.M., Dowda, M., Ward, D.S., Dishman, R.K., Trost, S.G., Saunders, R., & Pate, R.R. (2002). Differences in Physical Activity Between Black and White Girls Living in Rural and Urban Areas. *Journal of School Health*, 72(6), 250-255.
- Feinberg, E., Kavanagh, P., Young, R., & Prudent, N. (2008). Food insecurity and compensatory feeding practices among urban black families. *Pediatrics*, 122, 854-860.
- Fife-Schaw, C. (2006). Questionnaire design. In G. M. Breakwell, S. Hammond, C. Fife-Schaw, & J. A. Smith (Eds.), *Research methods in psychology* (3rd ed., pp. 210-231). London, England: Sage.
- Finkelstein, E.A., Fiebelkorn, I.C. and Wang, G. (2003). National medical expenditures attributable to overweight and obesity: how much, and who's paying? *Health Affairs*, W3: 219–226.
- Fisher, J.O., & Birch, L.L. (1999). Restricting access to foods and children's eating. *Appetite*, 32, 405–419.

Fisher, J.O., Rolls, B., & Birch, L.L. (2003). Children's bite size and intake of an entrée are greater with large portions than with age appropriate or self selected portions. *American Journal of Clinical Nutrition*, 77, 1164 – 70.

Fisher, J.O., Mitchell, D.C., Smiciklas-Wright, H., & Birch, L.L. (2002). Parental influences on young girls' fruit and vegetable, micronutrient, and fat intakes. *Journal of the American Dietetic Association*, 102, 58 – 64.

Flegal, K.M., Shepherd, J.A., Looker, A.C., Graubard, B.I., Borrud, L.G., Ogden, C. L., & Schenker, N. (2008). Comparisons of percentage body fat, body mass index, waist circumference, and waist-stature ratio in adults. *The American Journal of Clinical Nutrition*, 89(2), 500-508.

Flick, U. (2007). *Designing qualitative research*. London, England: Sage.

Fomon, S.J., Filmer, L.J., Thomas, L.N., Anderson, T.A., & Nelson, S.E. (1975). Influence Of Formula Concentration On Caloric Intake And Growth Of Normal Infants. *Acta Paediatrica*, 64(2), 172-181.

Ford, P.B., & Dzewaltowski, D.A. (2008). Disparities in obesity prevalence due to variation in the retail food environment: Three testable hypotheses. *Nutrition Reviews*, 66(4), 216-228.

Fox, M.K., Pac, S., Devaney, B., & Jankowski, L. (2004). Feeding infants and toddlers study: What foods are infants and toddlers eating? *Journal of the American Dietetic Association*, 104, 22-30.

Francis, L.A., & Birch, L.L. (2005). Maternal weight status modulates the effects of restriction on daughters' eating and weight. *International Journal of Obesity*, 29(8), 942–949.

Francis, L.A., Hofer, S.M., Birch, L.L. (2001). Predictors of maternal child feeding style: Maternal and child characteristics. *Appetite*, 37, 231–243.

Francis, L.A., Ventura, A.K., Marini, M., & Birch, L.L. (2007). Parent overweight predicts daughters increase in BMI and disinhibited overeating from 5 to 13 years. *Obesity (silver spring)*, 15/6, 1544 – 1553.

Freeman, M (2017). Monitoring and evaluation of global public health programs, Program theory: Action model, Rollin School of Public Health. Retrieved from <https://rsph.hosted.panopto.com/Panopto/Pages/Viewer.aspx?id=347276a5-817d-4996-b4d2-1de8000c4358>

Freedman, D.S., & Sherry, B. (2009). The validity of BMI as an indicator of body fatness and risk among children. *Pediatrics*, 124(1), S23-S34.

Freedman, D.S., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (1999). The Relation of Overweight to Cardiovascular Risk Factors Among Children and Adolescents: The Bogalusa Heart Study. *Pediatrics*, 103(6), 1175-1182.

Freedman, D.S., Khan, L.K., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (2001). Relationship of Childhood Obesity to Coronary Heart Disease Risk Factors in Adulthood: The Bogalusa Heart Study. *Pediatrics*, 108(3), 712-718.

Fryar, C.D., Carroll, M.D., & Ogden, C.L. (2012). Prevalence of obesity among children and adolescents: United States, trends 1963–1965 through 2009–2010. *National Center for Health Statistics. Health E-Stat*, 1-6. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity_child_09_10/obesity_child_09_10.pdf

Gabaccia, D.R. (1998). *We Are What We Eat: Ethnic Food and the Making of Americans*. Cambridge, MA: Harvard University Press.

Gallagher, D., Visser, M., Sepulveda, D., Pierson, R. N., Harris, T., & Heymsfield, S. B. (1996). How Useful Is Body Mass Index for Comparison of Body Fatness across Age, Sex, and Ethnic Groups? *American Journal of Epidemiology*, 143(3), 228-239.

Galloway, A.T, Lee, Y., & Birch, L. (2003). Predictors and consequences of food neophobia and pickiness in young girls. *Journal of the American Dietetic Association*, 103, 692 – 698.

Galloway, A.T, Fiorito, L.M, Lee, Y. & Birch, L.L. (2005). Parental pressure, dietary patterns and weight status among girls who are picky eaters. *J Am Diet Assoc*, 105, 541 – 8.

Galloway, A.T, Fiorito, L.M., Francis, L.A., & Birch, L.L. (2006). ‘Finish your soup’: Counterproductive effects of pressuring children to eat on intake and affect. *Appetite*, 46(3), 318-323.

Garasky, S., Stewart, S.D., Gundersen, C., Lohman, B.J., & Eisenmann, J.C. (2009). Family stressors and child obesity. *Social Science Research*, 38(4), 755-766.

Gardener, D., Connolly, H. (2005), *Who are the 'Other' ethnic groups?* London: Office for National Statistics.

Gardner, K., Salah, S., Leavey, C., Poncellato, L. (2010). The perfect size’: perceptions of and influences on body image and body size in young Somali women living in Liverpool; a qualitative study. *Divers Health Care*, 7 (1), 23-34.

Garner, S., & Bhattacharyya, G. (2011). *Poverty, ethnicity and place*. York: Joseph Rowntree Foundation.

Gatineau, M., & Mathrani, S. (2011a). Ethnicity and obesity in the UK. *Perspectives in public health*, 131(4), 159-160.

Gatineau, M., & Mathrani, S. (2011b). *Obesity and Ethnicity*. National Obesity Observatory. Oxford. Retrieved from <https://khub.net/documents/31798783/32039025/Obesity+and+ethnicity/834368ce-e47a-4ec6-b71c-7e4789bc7d19?version=1.0>

- Gearhardt, A., Roberto, C., Seamans, M., Corbin, W., & Brownell, K. (2013). Preliminary validation of the Yale Food Addiction Scale for children. *Eating Behaviors*, 14, 508–512.
- Geçkil, E., Şahin, T., & Ege, E. (2009). Traditional postpartum practices of women and infants and the factors influencing such practices in South Eastern Turkey. *Midwifery*, 25(1), 62-71.
- Gemmill, A.W., Worotniuk, T., Holt, C.J., Skouteris, H., & Milgrom, J. (2013). Maternal psychological factors and controlled child feeding practices in relation to child body mass index. *Childhood Obesity*, 9(4), 326-337.
- Gibson, E.L., Wardle, J., & Watts, C.J. (1998). Fruit and vegetable consumption, nutritional knowledge and beliefs in mothers and children. *Appetite*, 31, 205–228.
- Gibson, L.Y., Byrne, S.M., Davis, E.A., Blair, E., Jacoby, P., & Zubrick, S.R. (2007). The role of family and maternal factors in childhood obesity. *Medical Journal of Australia*, 186(11), 591–595.
- Gilbert, P.A., & Khokhar, S. (2008). Changing dietary habits of ethnic groups in Europe and implications for health. *Nutrition Reviews*, 66(4), 203-215.
- Gilbert, P., Gilbert, J., & Sanghera, J. (2004). A focus group exploration of the impact of izzat, shame, subordination and entrapment on mental health and service use in South Asian women living in Derby. *Mental Health, Religion & Culture*, 7(2), 109-130.
- Goisis, A., Sacker, A., & Kelly, Y. (2015). Why are poorer children at higher risk of obesity and overweight? A UK cohort study. *The European Journal of Public Health*, 26(1), 7-13.
- Golan, M. (2006). Parents as agents of change in childhood obesity - from research to practice. *International Journal of Pediatric Obesity*, 1, 66-76.
- Goodell, L.S., Pierce, M.B., Bravo, C.M., & Ferris, A.M. (2008). Parental perceptions of overweight during early childhood. *Qualitative Health Research*, 18(11), 1548-1555.
- Goodman, E., Hinden, B.R., & Khandelwal, S. (2000). Accuracy of Teen and Parental Reports of Obesity and Body Mass Index. *Pediatrics*, 106(1), 52-58.
- Gordon-Larsen, P., McMurray, R.G., & Popkin, B.M. (1999). Adolescent physical activity and inactivity vary by ethnicity: The National Longitudinal Study of Adolescent Health. *The Journal of Pediatrics*, 135(3), 301-306.
- Gordon-Larsen, P., Adair, L.S., & Popkin, B.M. (2002). Ethnic differences in physical activity and inactivity patterns and overweight status, *Obesity research*, 10(3), 141-149.

Gordon-Larsen, P., Adair, L.S., & Suchindran, C.M. (2007). Maternal obesity is associated with younger age at obesity onset in US adolescent offspring followed into adulthood. *Obesity*, 15(11), 2790-2796.

Gordon-Larsen, P., Harris, K.M., Ward, D.S., & Popkin, B.M. (2003). Acculturation and overweight-related behaviors among Hispanic immigrants to the US: the National Longitudinal Study of Adolescent Health. *Social Science & Medicine*, 57(11), 2023-2034.

Grace, C. (2011), Nutrition- related health management in a Bangladeshi community, *Proceedings of the Nutrition Society*, 70(1), 129-134.

Graneheim, U., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today*, 24(2), 105-112.

Grant, K.E., Compas, B.E., Stuhlmacher, A., Thurm, A., McMahon, S., & Halpert, J. (2003). Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychological Bulletin*, 129, 1477 – 466.

Green, J., & Thorogood, N. (2004). *Qualitative methods for Health Research*. London: Sage.

Greene, J. C., Caracelli, V. J. and Graham, W. F. (1989) Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis*. 11 (3), 255-274.

Greenhalgh, T., Helman, C., & Chowdury, M. (1998). Health beliefs and folk models of diabetes in British Bangladeshis: A qualitative study. *British Medical Journal*, 316, 978–983.

Grewal, I., & Ritchie, J. (2006). Ethnic and language matching of the researcher and the research group during design, fieldwork, and analysis. In J. Y. Nazroo (Ed.), *Health and social research in multiethnic societies*. London: Routledge.

Grimm, G.C., Harnack, L., & Story, M. (2004). Factors associated with soft drink consumption in school-aged children. *Journal of the American Dietetic Association*, 104, 1244–1249.

Gross, R.S., Velazco, N.K., Briggs, R.D., & Racine, A.D. (2013). Maternal Depressive Symptoms and Child Obesity in Low-Income Urban Families. *Academic pediatrics*, 13(4), 356-363.

Gross, T.T., Powell, R., Anderson, A.K., Hall, J., Davis, M., & Hilyard, K. (2015). WIC peer counselors' perceptions of breastfeeding in African American women with lower incomes. *Journal of Human Lactation*, 31(1), 99-110.

- Grote, V., Schiess, S.A., Closa-Monasterolo, R., Escribano, J., Giovannini, M., Scaglioni, S., & Koletzko, B. (2011). The introduction of solid food and growth in the first 2 y of life in formula-fed children: analysis of data from a European cohort study. *Am J Clin Nutr*, 94(6), 1785S–93S.
- Gu, C., Warkentin, S., Mais, L.A., & Carnell, S. (2017). Ethnic differences in parental feeding behaviors in UK parents of preschoolers. *Appetite*, 113, 398-404.
- Guba, E. G. and Lincoln, Y. S. (1994). Competing paradigms in qualitative research In Denzin, N. K. and Lincoln, Y. S. (Eds.) *Handbook of qualitative research*. Thousand Oaks: Sage.
- Guendelman, S., Fernald, L.C., Neufeld, L.M., & Fuentes-Afflick, E. (2010). Maternal perceptions of early childhood ideal body weight differ among Mexican-origin mothers residing in Mexico compared to California. *Journal of the American Dietetic Association*, 110(2), 222-229.
- Gunderson, E., Abrams, B., & Selvin, S. (2000). The relative importance of gestational gain and maternal characteristics associated with the risk of becoming overweight after pregnancy. *International Journal of Obesity*, 24(12), 1660-1668.
- Guo, S.S., Wu, W., Chumlea, W.C., & Roche, A.F. (2002). Predicting overweight and obesity in adulthood from body mass index values in childhood and adolescence. *The American Journal of Clinical Nutrition*, 76(3), 653-658.
- Hackie, M., & Bowles, C.L. (2007). Maternal perception of their overweight children. *Public Health Nursing*, 24(6), 538-546.
- Hahn, R.A., Truman, B.I., & Barker, N.D. (1996). Identifying ancestry: The reliability of ancestral identification in the United States by self, proxy, interviewer, and funeral director. *Epidemiology*, 7, 75–80.
- Hajna, S., Leblanc, P.J., Faight, B.E. (2014). Associations between family eating behaviours and body composition measures in peri-adolescents: Results from a community-based study of school-aged children. *Canadian Journal of Public Health*, 105(1), e15–e21.
- Halai, N. (2007). Making use of bilingual interview data: Some expressions from the field. *Qualitative Research Report*, 12(3) 344–355.
- Hales, C.N., & Barker, D.J. (2001). The thrifty phenotype hypothesis. *British Medical Bulletin*, 60(1), 5-20.
- Hales, C.M., Carroll, M.D., Fryar, C.D., & Ogden, C.L. (2017). Prevalence of obesity among adults and youth: United States, 2015–2016. NCHS Data Brief, no. 288. Retrieved from <https://www.cdc.gov/nchs/data/databriefs/db288.pdf>
- Hamdy, S.F. (2009). Islam, fatalism, and medical intervention: lessons from Egypt on the cultivation of forbearance (sabr) and reliance on God (tawakkul). *Anthropological Quarterly*, 82(1), 173–196.

- Hanna, L., Hunt, S., & Bhopal, R. S. (2006). Cross-cultural adaptation of a tobacco questionnaire for Punjabi, Cantonese, Urdu and Sylheti speakers: Qualitative research for better clinical practice, cessation services and research. *Journal of Epidemiology & Community Health*, 60(12), 1034-1039.
- Hanrahan, D., Sexton, P., Hui, K., Teitcher, J., Sugarman, J., London, A. J., Klitzman, R. (2015). Linguistic and Cultural Challenges in Communication and Translation in US-Sponsored HIV Prevention Research in Emerging Economies. *Plos One*, 10(7).
- Harbron, J., Booley, S., Najaar, B., & Day, C.E. (2013). Responsive feeding: Establishing healthy eating behaviour early on in life. *South African Journal of Clinical Nutrition*, 26(3), 141-149.
- Harder, T., Bergmann, R., Kallischnigg, G., & Plagemann, A. (2005). Duration of breastfeeding and risk of overweight: a meta-analysis. *American journal of epidemiology*, 162(5), 397-403.
- Harding, S., Teyhan, A., Maynard, M.J., & Cruickshank, J.K. (2008). Ethnic differences in overweight and obesity in early adolescence in the MRC DASH study: the role of adolescent and parental lifestyle. *International journal of epidemiology*, 37(1), 162-172.
- Harris, H., Mallan, K.M., Nambiar, S., & Daniels, L.A. (2014). The relationship between controlling feeding practices and boys' and girls' eating in the absence of hunger. *Eating Behaviors*, 15(4), 519-522.
- Harry, B. (1996). These Families, Those Families: The Impact of Researcher Identities on the Research Act. *Exceptional Children*, 62(4), 292-300.
- Harvey-Berino, J., & Rourke, J. (2003). Obesity Prevention in Preschool Native-American Children: A Pilot Study Using Home Visiting. *Obesity Research*, 11(5), 606-611.
- Hassanein, M.T., Lyon, H.N., Nguyen, T.T., Akylbekova, E.L., Waters, K., Lettre, G., & Hirschhorn, J.N. (2010). Fine mapping of the association with obesity at the FTO locus in African-derived populations. *Human Molecular Genetics*, 19(14), 2907-2916.
- Hasson, R.E., Hsu, Y.J., Davis, J.N., Goran, M.I., & Spruijt-Metz, D. (2017). The Influence of Parental Education on Dietary Intake in Latino Youth. *Journal of Immigrant and Minority Health*, 20(1), 250-254.
- Hausner, H., Olsen, A., & Møller, P. (2012). Mere exposure and flavour-flavour learning increase 2–3-year-old children's acceptance of a novel vegetable. *Appetite*, 58(3), 1152-1159.
- Hausner, H., Nicklaus, S., Issanchou, S., Mølgaard, C., & Møller, P. (2010). Breastfeeding facilitates acceptance of a novel dietary flavour compound. *Clinical Nutrition*, 29(1), 141-148.

- Hawkes, C., & Lobstein, T. (2011). Regulating the commercial promotion of food to children: a survey of actions worldwide. *Int J Pediatr Obes*, 6, 83-94.
- Haworth, C., Carnell, S., Meaburn, E.L., Davis, O.S., Plomin, R., & Wardle, J. (2008). Increasing heritability of BMI and stronger associations with the FTO gene over childhood. *Obesity*, 16(12), 2663-2668.
- Haycraft, E.L., & Blissett, J.M. (2008). Maternal and Paternal Controlling Feeding Practices: Reliability and Relationships With BMI. *Obesity*, 16(7), 1552-1558.
- Haycraft, E.L., Farrow, C., & Blissett, J. (2013). Maternal symptoms of depression are related to observations of controlling feeding practices in mothers of young children. *Journal of Family Psychology*, 27(1), 159.
- Headen, I.E., Davis, E.M., Mujahid, M.S., & Abrams, B. (2012). Racial-Ethnic Differences in Pregnancy-Related Weight. *Advances in Nutrition*, 3(1), 83-94.
- Hedderson, M.M., Gunderson, E.P., & Ferrara, A. (2010). Gestational Weight Gain and Risk of Gestational Diabetes Mellitus. *Obstetrics & Gynecology*, 115(3), 597-604.
- Herle, M., Fildes, A., Steinsbekk, S., Rijdsdijk, F., & Llewellyn, C.H. (2017). Emotional over- and under-eating in early childhood are learned not inherited. *Scientific Reports*, 7(1).
- Heslehurst, N., Sattar, N., Rajasingam, D., Wilkinson, J., Summerbell, C.D., & Rankin, J. (2012). Existing maternal obesity guidelines may increase inequalities between ethnic groups: a national epidemiological study of 502,474 births in England. *BMC pregnancy and childbirth*, 12(1), 156.
- Higgins, V., & Dale, A. (2010). Ethnic differences in physical activity and obesity. *Ethnicity and integration Springer*, 203-224
- Hill, A.J. (2011). Psychosocial issues in obese children and adults. In D. Crawford, R. Jeffery, K. Ball, J. Brug, (Eds). *Obesity epidemiology from aetiology to public health* (2nd ed.), Oxford University Press: Oxford, England.
- Hill, J.O., Sidney, S., Lewis, C.E., Tolan, K., Scherzinger, A.L., & Stamm, E.R. (1999). Racial differences in amounts of visceral adipose tissue in young adults: The CARDIA (Coronary Artery Risk Development in Young Adults) Study. *The American Journal of Clinical Nutrition*, 69(3), 381-387.
- Himes, J.H. (2009). Challenges of accurately measuring and using BMI and other indicators of obesity in children. *Pediatrics*, 124(1), S3-S22.
- Hiza, H.A., Casavale, K.O., Guenther, P.M., & Davis, C.A. (2013). Diet quality of Americans differs by age, sex, race/ethnicity, income, and education level. *Journal of the Academy of Nutrition and Dietetics*, 113(2), 297-306.

- Hoerr, S.L., Tsuei, E., Liu, Y., Franklin, F.A., & Nicklas, T. A. (2008). Diet Quality Varies by Race/Ethnicity of Head Start Mothers. *Journal of the American Dietetic Association*, 108(4), 651-659.
- Hoerr, S.L., Hughes, S.O., Fisher, J.O., Nicklas, T.A., Liu, Y., & Shewchuk, R.M. (2009). Associations among parental feeding styles and childrens food intake in families with limited incomes. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 55.
- Hofferth, S.L. (2003). Race/Ethnic Differences in Father Involvement in Two-Parent Families. *Journal of Family Issues*, 24(2), 185-216.
- Holloway, I., & Wheeler, S. (2002). Qualitative research in nursing (2nd ed.). Oxford: Blackwell Science.
- Holstein, J.A., & Gubrium, J.F. (2004). The active interview. In D. Silverman (Ed.), *Qualitative Research. Theory, Method and Practice* (pp. 140-161). London: Sage.
- Hornby-Turner Y. C., Hampshire, K. R., Pollard, T. M. (2014). A comparison of physical activity and sedentary behaviour in 9–11 year old British Pakistani and white British girls: a mixed methods study. *Int J Behav Nutr Phys Act*, 11:74.
- Hosper, K., Nierkens, V., Valkengoed, I.V., & Stronks, K. (2008). Motivational factors mediating the association between acculturation and participation in sport among young Turkish and Moroccan women in the Netherlands. *Preventive Medicine*, 47(1), 95-100.
- Houston, S. (2017). Towards a critical ecology of child development in social work: Aligning the theories of Bronfenbrenner and Bourdieu. *Families, Relationships and Societies*, 6(1), 53-69.
- Howe, C.J., Alexander, G., & Stevenson, J. (2017). Parents Underestimations of Child Weight: Implications for Obesity Prevention. *Journal of Pediatric Nursing*, 37, 57-61.
- Huang, C., & Lamb, M.E. (2014). Are Chinese Children More Compliant? Examination of the Cultural Difference in Observed Maternal Control and Child Compliance. *Journal of Cross-Cultural Psychology*, 45(4), 507-533.
- Huang, C., Cheah, C.S., Lamb, M.E., & Zhou, N. (2017). Associations Between Parenting Styles and Perceived Child Effortful Control Within Chinese Families in the United States, the United Kingdom, and Taiwan. *Journal of Cross-Cultural Psychology*, 48(6), 795-812.
- Huang, S.H., Parks, E.P., Kumanyika, S.K., Grier, S.A., Shults, J., Stallings, V.A., & Stettler, N. (2012). Child-feeding practices among Chinese-American and non-Hispanic white caregivers. *Appetite*, 58(3), 922-927.
- Hubbs-Tait, L., Kennedy, T.S., Page, M.C., Topham, G.L. & Harrist, A.W. (2008). Parental feeding practices predict authoritative, authoritarian and permissive parenting styles. *Journal of the American Dietetic Association*, 108, 1154 – 1161.

- Hughes, S.O., Power, T.G., Fisher, J.O., Mueller, S., & Nicklas, T.A. (2005). Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite*, 44(1), 83-92.
- Hughes, S.O., Power, T.G., Liu, Y., Sharp, C., & Nicklas, T.A. (2015). Parent emotional distress and feeding styles in low-income families. The role of parent depression and parenting stress. *Appetite*, 92, 337-342.
- Hughes, S.O., Power, T.G., O'Connor, T.M., Fisher, J.O., & Chen, T. (2016). Maternal Feeding Styles and Food Parenting Practices as Predictors of Longitudinal Changes in Weight Status in Hispanic Preschoolers from Low-Income Families. *Journal of Obesity*, 2016, 1-9.
- Hughes, S.O., Shewchuk, R.M., Baskin, M.L., Nicklas, T.A., & Qu, H. (2008). Indulgent feeding style and children's weight status in preschool. *Journal of developmental and behavioral pediatrics: JDBP*, 29(5), 403-410.
- Huh, S.Y., Rifas-Shiman, S.L., Taveras, E.M., Oken, E., & Gillman, M.W. (2011). Timing of Solid Food Introduction and Risk of Obesity in Preschool-Aged Children. *Pediatrics*, 127(3), e544-51.
- Hurley, K.M., Black, M.M., Papas, M.A., & Caufield, L.E. (2008). Maternal symptoms of stress, depression and anxiety are related to nonresponsive feeding styles in a statewide sample of WIC participants. *The Journal of Nutrition*, 138, 799 – 805.
- Hurley, K.M., Cross, M.B., & Hughes, S.O. (2011). A Systematic Review of Responsive Feeding and Child Obesity in High-Income Countries. *The Journal of Nutrition*, 141(3), 495-501.
- Hussain, F.A., & Cochrane, R. (2003). Living with depression: Coping strategies used by South Asian women, living in the UK, suffering from depression. *Mental Health, Religion & Culture*, 6(1), 21-44.
- Hyland, M.E., Irvine, S.H., Thacker, C., Dann, P.L., & Dennis, I. (1989). Psychometric analysis of the Stunkard-Messick Eating Questionnaire (SMEQ) and comparison with the Dutch Eating Behavior Questionnaire (DEBQ). *Current Psychology*, 8(3), 228-233.
- Ingelsson, E., Sullivan, L.M., Fox, C.S., Murabito, J.M., Benjamin, E.J., Polak, J.F., & Vasan, R.S. (2007). Burden and prognostic importance of subclinical cardiovascular disease in overweight and obese individuals. *Circulation*, 116(4), 375-384.
- Ingram, J., Johnson, D., & Hamid, N. (2003). South Asian grandmothers' influence on breast feeding in Bristol. *Midwifery*, 19(4), 318-327.
- Jackson, K.M., & Trochim, W.M. (2002). Concept mapping as an alternative approach for the analysis of open-ended survey responses. *Organizational Research Methods*, 5(4), 307-336.

- Jackson, R., & Nesbitt, E. (1993). *Hindu Children in Britain*. Stoke-on-Trent: Trentham.
- Jacobi, C., Agras, W.S., & Hammer, L. (2001). Predicting children's reported eating disturbances at 8 years of age. *J Am Acad Child Adolescent Psychiatry*, 40, 364 – 72
- Jahnke, D.L., & Warschburger, P.A. (2008). Familial transmission of eating behaviours in preschool aged children. *Obesity*, 16(8), 1821–1825.
- Jain, A., Sherman, S.N., Chamberlin, D.L., Carter, Y., Powers, S.W., & Whitaker, R.C. (2001). Why Dont Low-Income Mothers Worry About Their Preschoolers Being Overweight? *Pediatrics*, 107(5), 1138-1146.
- Jambunathan, S., Burts, D.C., & Pierce, S. (2000). Comparisons of parenting attitudes among five ethnic groups in the United States. *Journal of Comparative Family Studies*, 395-406.
- James, D. (2004). Factors influencing food choices, dietary intake, and nutrition-related attitudes among African Americans: Application of a culturally sensitive model. *Ethnicity & Health*, 9(4), 349-367.
- James, D., Pobee, J.W., Brown, L., & Joshi, G. (2012). Using the Health Belief Model to Develop Culturally Appropriate Weight-Management Materials for African-American Women. *Journal of the Academy of Nutrition and Dietetics*, 112(5), 664-670.
- Jansen, E., Mulkens, S., Emond, Y., & Jansen, A. (2008). From the Garden of Eden to the land of plenty: Restriction of fruit and sweets intake leads to increased fruit and sweets consumption in children. *Appetite*, 51(3), 570-575.
- Jansen, E., Williams, K.E., Mallan, K.M., Nicholson, J.M., & Daniels, L.A. (2018). Bidirectional associations between mothers' feeding practices and child eating behaviours. *International Journal of Behavioral Nutrition and Physical Activity*, 15(1).
- Jansen, P.W., Barse, L.M., Jaddoe, V.W., Verhulst, F.C., Franco, O.H., & Tiemeier, H. (2017). Bi-directional associations between child fussy eating and parents pressure to eat: Who influences whom? *Physiology & Behavior*, 176, 101-106.
- Jansen, P.W., Roza, S.J., Jaddoe, V.W., Mackenbach, J.D., Raat, H., Hofman, A., & Tiemeier, H. (2012). Children's eating behavior, feeding practices of parents and weight problems in early childhood: results from the population-based Generation R Study. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 130.
- Jansen, P.W., Tharner, A., Ende, J.V., Wake, M., Raat, H., Hofman, A., & Tiemeier, H. (2014). Feeding practices and child weight: is the association bidirectional in preschool children? *American Journal of Clinical Nutrition*, 100(5), 1329-1336.

- Janssen, I., Katzmarzyk, P.T., Boyce, W.F., King, M.A., & Pickett, W. (2004). Overweight and obesity in Canadian adolescents and their associations with dietary habits and physical activity patterns. *Journal of Adolescent Health*, 35(5), 360-367.
- Jayaweera, H., & Quigley, M.A. (2010). Health status, health behaviour and healthcare use among migrants in the UK: Evidence from mothers in the Millennium Cohort Study. *Social Science & Medicine*, 71(5), 1002-1010.
- Jayaweera, H., Hockley, C.A., Redshaw, M.E., & Quigley, M.A. (2007) Millennium Cohort Study First Survey Demographic and socio-economic characteristics of ethnic minority mothers in England. University of Oxford.
- Jeffery, A.N., Voss, L.D., Metcalf, B.S., Alba, S., & Wilkin, T.J. (2004). Parents awareness of overweight in themselves and their children: Cross sectional study within a cohort (EarlyBird 21). *BMJ*, 330(7481), 23-24.
- Jia, H., & Lubetkin, E.I. (2005). The impact of obesity on health-related quality-of-life in the general adult US population. *Journal of Public Health*, 27(2), 156-164.
- Johannsen, D.L., Johannsen, N.M., & Specker, B.L. (2006). Influence of Parents' Eating Behaviors and Child Feeding Practices on Children's Weight Status. *Obesity*, 14(3), 431-439.
- Johnson, R.B, Onwuegbuzie, A.J. (2004). Mixed methods research: a research paradigm whose time has come. *Educational Researcher*, 33, 14-26.
- Johnson, F., & Wardle, J. (2005). Dietary restraint, body dissatisfaction, and psychological distress: a prospective analysis. *Journal of abnormal psychology*, 114(1), 119.
- Johnson, J.A., & Johnson, A.M. (2015). Urban-rural differences in childhood and adolescent obesity in the United States: A systematic review and meta-analysis. *Childhood Obesity*, 11(3), 233-241.
- Johnson, A., Kirk, R., Rosenblum, K.L., & Muzik, M. (2015). Enhancing breastfeeding rates among African American women: A systematic review of current psychosocial interventions. *Breastfeeding Medicine*, 10(1), 45-62.
- Johnson, D.B., Gerstein, D.E., Evans, A.E., & Woodward-Lopez, G. (2006). Preventing obesity: a life cycle perspective. *Journal of the American Dietetic Association*, 106(1), 97-102.
- Johnson, L., Mander, A.P., Jones, L.R., Emmett, P.M., & Jebb, S.A. (2008). Energy-dense, low-fiber, high-fat dietary pattern is associated with increased fatness in childhood. *The American Journal of Clinical Nutrition*, 87(4), 846-854.
- Jones, N., & Sumner, A (2009). Does mixed methods research matter to understanding childhood well-being? *Social Indicators Research*, 90, 33-50.

- Kaakinen, M., Läärä, E., Pouta, A., Hartikainen, A.L., Laitinen, J., Tammelin, T.H., & Järvelin, M.R. et al., (2010). Life-course analysis of a fat mass and obesity-associated (FTO) gene variant and body mass index in the Northern Finland Birth Cohort 1966 using structural equation modeling. *American journal of epidemiology*, 172(6), 653-665.
- Kahn, H.S., Imperatore, G., & Cheng, Y.J. (2005) A population-based comparison of BMI percentiles and waist-to height ratio for identifying cardiovascular risk in youth. *Journal of Pediatrics*, 146(4), 482–488.
- Kalies, H., Heinrich, J., Borte, M., Schaaf, B., von Berg, A., von Kries, R. et al. (2005). The effect of breastfeeding on weight gain in infants: results of a birth cohort study. *European journal of medical research*, 10, 36–37.
- Kao, G. (2004). Parental Influences on the Educational Outcomes of Immigrant Youth. *International Migration Review*, 38(2), 427-449.
- Karlsson, J., Persson, L.O., Sjöström, L., & Sullivan, M. (2000). Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. *International journal of obesity*, 24(12), 1715.
- Kelly, E.B., Parra-Medina, D., Pfeiffer, K.A., Dowda, M., Conway, T.L., Webber, L.S., Pate, R.R. (2010). Correlates of Physical Activity in Black, Hispanic, and White Middle School Girls. *Journal of Physical Activity and Health*, 7(2), 184-193.
- Kelly, Y., Panico, L., Bartley, M., Marmot, M., Nazroo, J., & Sacker, A. (2009). Why does birthweight vary among ethnic groups in the UK? Findings from the Millennium Cohort Study. *Journal of Public Health*, 31(1), 131-137.
- Kelsey, M.M., Zaepfel, A., Bjornstad, P., & Nadeau, K.J. (2014). Age-Related Consequences of Childhood Obesity. *Gerontology*, 60(3), 222-228.
- Kenchiah, S., Evans, J.C., Levy, D., Wilson, P.W., Benjamin, E.J., Larson, M.G., & Vasan, R.S. (2002). Obesity and the risk of heart failure. *New England Journal of Medicine*, 347(5), 305-313.
- Kenney, E.L., Gortmaker, S.L., Davison, K.K., & Austin, S.B. (2015). The academic penalty for gaining weight: A longitudinal, change-in-change analysis of BMI and perceived academic ability in middle school students. *International Journal of Obesity*, 39(9), 1408-1413.
- Kenway, P., & Palmer, G. (2007). Poverty among ethnic groups: How and why does it differ?. York: Joseph Rowntree Foundation.
- Khader, Y., Irshaidat, O., Khasawneh, M., Amarin, Z., Alomari, M., & Batieha, A. (2009). Overweight and obesity among school children in Jordan: prevalence and associated factors. *Maternal and child health journal*, 13(3), 424-431.

Khambhaita, P., Willis, R., Pathak, P., & Evandrou, M. (2017). Recruitment of South Asian research participants and the challenges of ethnic matching: age, gender and migration history, Centre for research on ageing, 1-18.

Killion, L., Hughes, S.O., Wendt, J.C., Pease, D., Nicklas, T.A., (2006). Minority mothers' perceptions of children's body size. *Int J Pediatr Obes*, 1, 96-102.

King, A.C., Castro, C., Wilcox, S., Eyler, A.A., Sallis, J.F., & Brownson, R.C. (2000). Personal and environmental factors associated with physical inactivity among different racial-ethnic groups of U.S. middle-aged and older-aged women. *Health Psychology*, 19(4), 354-364.

Kinra, S., Nelder, R.P., & Lewendon, G.J. (2000). Deprivation and childhood obesity: A cross sectional study of 20,973 children in Plymouth, United Kingdom. *Journal of Epidemiology & Community Health*, 54(6), 456-460.

Kitzinger, J. (2005). Focus group research: using group dynamics to explore perceptions, experiences and understandings. In I. Holloway (Ed.), *Qualitative Research in Health Care*. Maidenhead: Open University Press.

Kitzinger, J. (1995) Qualitative research: introducing focus groups, *British Medical Journal*, 311, 7000, 299-302.

Kong, A., Odoms-Young, A.M., Schiffer, L.A., Berbaum, M.L., Porter, S.J., Blumstein, L., & Fitzgibbon, M.L. (2013). Racial/Ethnic Differences in Dietary Intake among WIC Families Prior to Food Package Revisions. *Journal of Nutrition Education and Behavior*, 45(1), 39-46.

Koupil, I., Tooth, L., Heshmati, A., & Mishra, G. (2016). Social patterning of overeating, binge eating, compensatory behaviours and symptoms of bulimia nervosa in young adult women: results from the Australian Longitudinal Study on Women's Health. *Public Health Nutrition*, 19(17), 3158-3168.

Kral, T.V., & Faith, M.S. (2009). Influences on Child Eating and Weight Development from a Behavioral Genetics Perspective. *Journal of Pediatric Psychology*, 34(6), 596-605.

Kral, T.V., & Rauh, E.M. (2010). Eating behaviors of children in the context of their family environment. *Physiology & behavior*, 100(5), 567-573.

Krippendorff, K. (1969). Models of messages: three prototypes. In G. Gerbner, O.R. Holsti, K. Krippendorff, G.J. Paisly & Ph.J. Stone (Eds.), *The analysis of communication content*. New York: Wiley.

Kroller, K., & Warschburger, P. (2008). Associations between maternal feeding style and food intake of children with a higher risk for overweight. *Appetite*, 51, 166 – 172.

- Kroller, K., Jahnke, D., & Warschburger, P. (2013). Are maternal weight, eating and feeding practices associated with emotional eating in childhood?. *Appetite*, 65, 25–30.
- Krueger, R.A., & Casey, M.A. (2015). Focus groups: a practical guide for applied research. Thousand Oaks, CA: Sage Publications.
- Kuepper-Nybelen, J., Lamerz, A., Bruning, N., Hebebrand, J., Herpertz-Dahlmann, B., & Brenner, H. (2005). Major differences in prevalence of overweight according to nationality in preschool children living in Germany: determinants and public health implications. *Archives of Disease in Childhood*, 90(4), 359-363.
- Kulesher, R.R., & Forrestal, E.E. (2014). International models of health systems financing. *Journal of Hospital Administration*, 3(4).
- Kumanyika, S.K. (2008). Environmental influences on childhood obesity: Ethnic and cultural influences in context. *Physiology & Behavior*, 94(1), 61-70.
- Kumanyika, S.K., & Grier, S. (2006). Targeting interventions for ethnic minority and low-income populations. *The Future of Children*, 16(1), 187-207.
- Kurrien, R., & Vo, E.D. (2004). Who's in charge?: Coparenting in South and Southeast Asian families. *Journal of Adult Development*, 11(3), 207–219.
- Lakshmi, S., Metcalf, B., Joglekar, C., Yajnik, C.S., Fall, C.H., & Wilkin, T.J. (2012). Differences in body composition and metabolic status between white UK and Asian Indian children (EarlyBird 24 and the Pune Maternal Nutrition Study). *Pediatric obesity*, 7(5), 347-354.
- Lambert, S.D., & Loiselle, C.G. (2008). Combining individual interviews and focus groups to enhance data richness. *Journal of Advanced Nursing*, 62(2), 228-237.
- Lambert, L., Raidl, M., Safaii, S., Conner, C., Geary, E.J., & Ault, S. (2005). Perceived Benefits and Barriers Related to Postpartum Weight Loss of Overweight/Obese Postpartum WIC Participants. *Topics in Clinical Nutrition*, 20(1), 16-27.
- Lampard, A.M., Byrne, S.M., Zubrick, S.R., & Davis, E.A. (2008). Parents' concern about their children's weight. *International Journal of Pediatric Obesity*, 3(2), 84-92.
- Landon, M.B., Spong, C.Y., Thom, E., Carpenter, M.W., Ramin, S.M., Casey, B., & Anderson, G.B. (2009). A multicenter, randomized trial of treatment for mild gestational diabetes. *New England Journal of Medicine*, 361(14), 1339-1348.
- Larnkjaer, A., Hoppe, C., Mølgaard, C., & Michaelsen, K.F. (2009). The effects of whole milk and infant formula on growth and IGF-I in late infancy. *European Journal of Clinical Nutrition*, 63(8), 956-963.
- Laroia, N., & Sharma, D. (2006). The Religious and Cultural Bases for Breastfeeding Practices Among the Hindus. *Breastfeeding Medicine*, 1(2), 94-98.

Lau-Clayton, C. (2014). *British Chinese Families. Parenting approaches, household relationships and childhood experiences*. Hampshire: Palgrave Macmillan.

Lauzon-Guillain, D., Romon, M., Musher-Eizenman, D., Heude, B., Basdevant, A., & Charles, M.A. (2009). Cognitive restraint, uncontrolled eating and emotional eating: correlations between parent and adolescent. *Maternal & child nutrition*, 5(2), 171-178.

Lawrence, J.M., Devlin, E., Macaskill, S., Kelly, M., Chinouya, M, Raats, M.M, Barton, K.L., Wrieden, W.L. & Shepherd, R. (2007). Factors that affect the food choices made by girls and young women, from minority ethnic groups, living in the UK, *Journal of Human Nutrition and Dietetics*, 20, 311-319.

Law, M., Stewart, D., & Pollock, N. (1998). Critical Review Form - Quantitative Studies. Retrieved from <http://srs-mcmaster.ca/wp-content/uploads/2015/04/Critical-Review-Form-Quantitative-Studies-English.pdf>

Lawton, R., Ashley, L., Dawson, S., Waiblinger, D., & Conner, M. (2012). Employing an extended Theory of Planned Behaviour to predict breastfeeding intention, initiation, and maintenance in White British and South-Asian mothers living in Bradford. *British journal of health psychology*, 17(4), 854-871.

Lawton, J., Ahmad, N., Hanna, L., Douglas, M., Bains, H., & Hallowell, N. (2008). 'We should change ourselves, but we can't': accounts of food and eating practices amongst British Pakistanis and Indians with type 2 diabetes. *Ethnicity & Health*, 13(4), 305-319.

Lee, J., & Bowen, N.K. (2006). Parent Involvement, Cultural Capital, and the Achievement Gap Among Elementary School Children. *American Educational Research Journal*, 43(2), 193-218.

Lee, S.Y., & Gallagher, D. (2008). Assessment methods in human body composition. *Current Opinion in Clinical Nutrition and Metabolic Care*, 11(5), 566-572.

Lee, L., Arthur, A., & Avis, M. (2008). Using self-efficacy theory to develop interventions that help older people overcome psychological barriers to physical activity: A discussion paper. *International Journal of Nursing Studies*, 45(11), 1690-1699.

Legesse, M., Demena, M., Mesfin, F., & Haile, D. (2014). Prelacteal feeding practices and associated factors among mothers of children aged less than 24 months in Raya Kobo district, North Eastern Ethiopia: A cross-sectional study. *International Breastfeeding Journal*, 9(1).

Leon, D.A., & Moser, K. (2012). Low birth weight persists in South Asian babies born in England and Wales regardless of maternal country of birth. Slow pace of acculturation, physiological constraint or both? Analysis of routine data. *J Epidemiol Commun Health*, 66(6), 544-551.

- Leung, K., Lau, S., & Lam, W.L. (1998). Parenting styles and achievement: A cross-cultural study. *Merrill-Palmer Quarterly*, 44(2), 157–172.
- Levesque, A. & Li, H. (2014). The relationship between culture, health conceptions, and health practices: A qualitative-quantitative approach. *Journal of Cross-Cultural Psychology*, 45, 628-645.
- Lewis, M., & Worobey, J. (2011). Mothers and toddlers lunch together. The relation between observed and reported behavior. *Appetite*, 56(3), 732-736.
- Liamputtong, P. (2011). Focus group methodology: Principles and practice. Thousand Oaks, CA: Sage.
- Li, M., Dibley, M.J., Sibbritt, D., & Yan, H. (2006). Factors associated with adolescents' physical inactivity in Xi'an City, China. *Medicine and science in sports and exercise*, 38(12), 2075-2085.
- Li, H., Wu, Y., Loos, R.J., Hu, F.B., Liu, Y., Wang, J., & Lin, X. (2007). Variants in the Fat Mass and Obesity-Associated (FTO) Gene Are Not Associated With Obesity in a Chinese Han Population. *Diabetes*, 57(1), 264-268.
- Liem, D. G., Mars, M., & Graaf, C. D. (2004). Sweet preferences and sugar consumption of 4- and 5-year-old children: Role of parents. *Appetite*, 43(3), 235-245.
- Lin, B.H., & Morrison, R.M. (2002). Higher fruit consumption linked with lower body mass index. *Food Review*, 25(3), 28–32.
- Lin, C.J., Deroo, L.A., Jacobs, S.R., & Sandler, D.P. (2011). Accuracy and reliability of self-reported weight and height in the Sister Study. *Public Health Nutrition*, 15(6), 989-999.
- Lincoln, Y.S., & Guba, E.G. (1985). *Naturalistic Inquiry*. Newbury Park, CA: Sage publications.
- Lindberg, N.M., & Stevens, V.J. (2007). Review: Weight-loss interventions with Hispanic populations. *Ethnicity & Disease*, 17, 397-402.
- Lindsay, A.C., Sussner, K.M., Greaney, M.L., & Peterson, K.E. (2011). Latina mothers' beliefs and practices related to weight status, feeding, and the development of child overweight. *Public Health Nursing*, 28(2), 107-118.
- Liu, W., Mallan, K. M., Mahrshahi, S., & Daniels, L. A. (2014). Feeding beliefs and practices of Chinese immigrant mothers. Validation of a modified version of the Child Feeding Questionnaire. *Appetite*, 80, 55-60.
- Liu, J., Probst, J.C., Harun, N., Bennett, K.J., & Torres, M.E. (2009). Acculturation, physical activity, and obesity among Hispanic adolescents. *Ethnicity & Health*, 14(5), 509-525.

Livingston, G. (2015). Childlessness falls, family size grows among highly educated women. Washington, DC: Pew Research Center.

Llewellyn, C., & Wardle, J. (2015). Behavioral susceptibility to obesity: gene–environment interplay in the development of weight. *Physiology & behavior*, 152, 494-501.

Llewellyn, A., Simmonds, M., Owen, C.G., & Woolacott, N. (2015). Childhood obesity as a predictor of morbidity in adulthood: A systematic review and meta-analysis. *Obesity Reviews*, 17(1), 56-67.

Lloyd, L.J., Langley-Evans, S.C., & McMullen, S. (2010). Childhood obesity and adult cardiovascular disease risk: A systematic review. *International Journal of Obesity*, 34(1), 18-28.

Lloyd, L. J., Langley-Evans, S. C., & McMullen, S. (2012). Childhood obesity and risk of the adult metabolic syndrome: A systematic review. *International Journal of Obesity*, 36(1), 1-11.

Lofink, H.E. (2012), ‘The worst of the Bangladeshi and the worst of the British’: exploring eating patterns and practices among British Bangladeshi adolescents in East London, *Ethnicity & health*, 17(4), 385-401.

Lora, K.R., Hubbs-Tait, L., Ferris, A.M., & Wakefield, D. (2016). African-American and Hispanic childrens beverage intake: Differences in associations with desire to drink, fathers feeding practices, and weight concerns. *Appetite*, 107, 558-567.

Lovejoy, M., Graczyk, P.A., Ohare, E., & Neuman, G. (2000). Maternal depression and parenting behavior. *Clinical Psychology Review*, 20(5), 561-592.

Lucas, A., Murray, E., & Kinra, S. (2013). Heath Beliefs of UK South Asians Related to Lifestyle Diseases: A Review of Qualitative Literature. *Journal of Obesity*, 2013, 1-13.

Lumeng, J.C., & Burke, L.M. (2006). Maternal prompts to eat, child complicity and mother and child weight status. *Journal of Pediatrics*, 149, 330–35.

Lynch, E., Liu, K., Wei, G. S., Spring, B., Kiefe, C., & Greenland, P. (2009). The relation between body size perception and change in body mass index over 13 years: the Coronary Artery Risk Development in Young Adults (CARDIA) study. *American journal of epidemiology*, 169(7), 857-866.

Maccoby, E.E., & Martin, J.A. (1983). Socialization in the context of the family: Parent–child interaction. In P. H. Mussen & E. M. Hetherington (Eds.), *Handbook of child psychology: Socialization, personality, and social development* (4th ed., pp. 1-101). New York: Wiley.

Macht, M. (2008). How emotions affect eating: a five-way model. *Appetite*, 50(1), 1-11.

Macartney, S., Bishaw, A., & Fontenot, K. (2013). Poverty rates for selected detailed race and hispanic groups by state and place: 2007–2011. American community survey brief. Retrieved from <http://www.census.gov/prod/2013pubs/acsbr11-17.pdf>

Mackenzie, E.R., Taylor, L., Bloom, B.S., Hufford, D.J., & Johnson, J.C. (2003). Ethnic minority use of complementary and alternative medicine (CAM): A national probability survey of CAM utilizers. *Alternative Therapies*, 9(4), 50-56.

Maes, H.H.M., Neale, M.C., & Eaves, L.J. (1997). Genetic and environmental factors in relative body weight and human adiposity. *Behavior Genetics*, 27 (4), 325–351.

Maiter, S., & George, U. (2003). Understanding context and culture in the parenting approaches of immigrant South Asian mothers. *Affilia: Journal of Women and Social Work*, 18(4), 411-428.

Mannion, C.A., Gray-Donald, K., Koski, K.G. (2006). Association of low intake of milk and vitamin D during pregnancy with decreased birthweight. *CMAJ*, 174, 1273–1277.

Marlow, L.A., Waller, J., Evans, R.E., & Wardle, J. (2009). Predictors of interest in HPV vaccination: A study of British adolescents. *Vaccine*, 27(18), 2483-2488.

Marques, A., Peralta, M., Naia, A., Loureiro, N., & Matos, M.G. (2017). Prevalence of adult overweight and obesity in 20 European countries, 2014. *European Journal of Public Health*.

Marshall, T.A., Eichenberger-Gilmore, J.M., Broffitt, B.A., Warren, J.J., & Levy, S.M. (2007). Dental caries and childhood obesity: roles of diet and socioeconomic status. *Community Dentistry and Oral Epidemiology*, 35(6), 449-458.

Mason, J. (2002). *Qualitative Researching*, Thousand Oaks: Sage Publication.

Massion, S., Wickham, S., Pearce, A., Barr, B., Law, C., & Taylor-Robinson, D. (2016). Exploring the impact of early life factors on inequalities in risk of overweight in UK children: findings from the UK Millennium Cohort Study. *Archives of Disease in Childhood*, 101(8), 724-730.

Matheson, D.M., Robinson, T.N., Varady, A., & Killen, J.D. (2006). Do Mexican-American Mothers' Food-Related Parenting Practices Influence Their Children's Weight and Dietary Intake? *Journal of the American Dietetic Association*, 106(11), 1861-1865.

Maynard, L.M., Galuska, D.A., Blanck, H.M., & Serdula, M.K. (2003). Maternal perceptions of weight status of children. *Pediatrics*, 111(1), 1226-1231.

Maynard, M.J., Baker, G., Rawlins, E., Anderson, A., & Harding, S. (2009), Developing obesity prevention interventions among minority ethnic children in schools and places of worship: The DEAL (DiEt and Active Living) study, *BMC Public Health*, 9(1), 480.

Mayring, P. (2000). Qualitative content analysis [28 paragraphs]. Forum Qualitative Sozialforschung / Forum: *Qualitative Social Research* [On-line Journal], 1(2).

Mazur, R.E., Marquis, G.S., & Jensen, H.H. (2003). Diet and food insufficiency among Hispanic youths: acculturation and socioeconomic factors in the third National Health and Nutrition Examination Survey. *The American Journal of Clinical Nutrition*, 78(6), 1120-1127.

McAndrew, F., Thompson, J., Fellows, L., Large, A., Speed, M., & Renfrew, M. J. (2012). Infant feeding survey 2010. *Leeds: Health and Social Care Information Centre*.

McArthur, L.H., Anguiano, R., & Gross, K.H. (2004), Are household factors putting immigrant Hispanic children at risk of becoming overweight: a community-based study in eastern North Carolina, *Journal of community health*, 29(5), 387-404.

McConley, R.L., Mrug, S., Gilliland, M.J., Lowry, R., Elliott, M.N., Schuster, M.A., & Franklin, F.A. (2011). Mediators of maternal depression and family structure on child BMI: parenting quality and risk factors for child overweight. *Obesity*, 19(2), 345-352.

Mccormick, B., & Stone, I. (2007). Economic costs of obesity and the case for government intervention. *Obesity Reviews*, 8(S1), 161-164.

McCurdy, K., Gorman, K.S., Kisler, T., & Metallinos-Katsaras, E. (2014). Associations between family food behaviors, maternal depression, and child weight among low-income children. *Appetite*, 79, 97-105.

Mcfadden, A., Renfrew, M.J., & Atkin, K. (2012). Does cultural context make a difference to women's experiences of maternity care? A qualitative study comparing the perspectives of breast-feeding women of Bangladeshi origin and health practitioners. *Health Expectations*, 16(4).

McGill, H. C., McMahan, C. A., Zieske, A. W., Malcom, G. T., Tracy, R. E., & Strong, J. P. (2001). Effects of nonlipid risk factors on atherosclerosis in youth with a favorable lipoprotein profile. *Circulation*, 103(11), 1546-1550.

McGoldrick, M., Giordano, J., & Garcia-Preto, N. (2005). Ethnicity and family therapy. New York: Guilford Press.

McGuire, K.A., & Ross, R. (2010) Measuring body composition in adults and children. In P. G. Kopelman, I. D. Caterson, W. H. Dietz, William H. (Eds.). *Clinical obesity in adults and children* (3rd ed., pp. 15-24), Wiley-Blackwell.

McPhie, S., Skouteris, H., Fuller-Tyszkiewicz, M., McCabe, M., Ricciardelli, L.A., Milgrom, J., Dellaquila, D. (2012). Maternal predictors of preschool child-eating behaviours, food intake and body mass index: a prospective study. *Early Child Development and Care*, 182(8), 999-1014.

- Melgar-Quiñonez, H.R., & Kaiser, L.L. (2004). Relationship of child-feeding practices to overweight in low-income Mexican-American preschool-aged children. *Journal of the American Dietetic Association*, 104(7), 1110-1119.
- Menigoz, K., Nathan, A., & Turrell, G. (2016). Ethnic differences in overweight and obesity and the influence of acculturation on immigrant bodyweight: evidence from a national sample of Australian adults. *BMC Public Health*, 16(1).
- Mennella, J.A., Pepino, M.Y., & Reed, D.R. (2005). Genetic and environmental determinants of bitter perception and sweet preferences. *Paediatrics*, 115, 216–222.
- Meyer, A.A., Kundt, G., Lenschow, U., Schuff-Werner, P., & Kienast, W. (2006). Improvement of Early Vascular Changes and Cardiovascular Risk Factors in Obese Children After a Six-Month Exercise Program. *Journal of the American College of Cardiology*, 48(9), 1865-1870.
- Mikkelsen, M.V., Husby, S., Skov, L.R., & Perez-Cueto, F.J. (2014). A systematic review of types of healthy eating interventions in preschools. *Nutrition Journal*, 13(1), 56.
- Mir, G., Salway, S., Kai, J., Karlsen, S., Bhopal, R., Ellison, G.T., & Sheikh, A. (2013). Principles for research on ethnicity and health: the Leeds Consensus Statement. *The European Journal of Public Health*, 23(3), 504-510.
- Mitchell, S., Brennan, L., Hayes, L., & Miles, C.L. (2009). Maternal psychosocial predictors of controlling parental feeding styles and practices. *Appetite*, 53(3), 384-389.
- Mitchell, G.L., Farrow, C., Haycraft, E., & Meyer, C. (2013). Parental influences on children's eating behaviour and characteristics of successful parent-focussed interventions. *Appetite*, 60, 85-94.
- Moens, E., Braet, C., & Soetens, B. (2006). Observation of Family Functioning at Mealtime: A Comparison Between Families of Children With and Without Overweight. *Journal of Pediatric Psychology*, 32(1), 52-63.
- Molix, L., & Bettencourt, B.A. (2010). Predicting well-being among ethnic minorities: Psychological empowerment and group identity. *Journal of Applied Social Psychology*, 40(3), 513-533.
- Momin, S.R., Chung, K.R., Olson, B.H. (2014). A qualitative study to understand positive and negative child feeding behaviors of immigrant Asian Indian mothers in the US. *Maternal and Child Health Journal*, 18, 1699-1710.
- Monnery-Patris, S., Rigal, N., Chabanet, C., Boggio, V., Lange, C., Cassuto, D.A., & Issanchou, S. (2011). Parental practices perceived by children using a French version of the Kids' Child Feeding Questionnaire. *Appetite*, 57(1), 161-166.
- Montgomery, C., Jackson, D.M., Kelly, L.A., & Reilly, J.J. (2006). Parental feeding style, energy intake and weight status in young Scottish children. *British Journal of Nutrition*, 96(06), 1149.

- Moore, L.V., & Diez Roux, A.V. (2006). Associations of neighborhood characteristics with the location and type of food stores. *American journal of public health*, 96(2), 325-331.
- Moore, G., Audrey, S., Barker, M., Bond, L., Bonell, C., Cooper, C., & Baird, J. (2013). Process evaluation in complex public health intervention studies: the need for guidance. *Journal of Epidemiology and Community Health*, 68(2), 101-102.
- Morrison, H., Power, T.G., Nicklas, T., & Hughes, S.O. (2013). Exploring the effects of maternal eating patterns on maternal feeding and child eating. *Appetite*, 63, 77-83.
- Morrow, S. L. (2005). Quality and trustworthiness in qualitative research in counseling psychology. *Journal of Counseling Psychology*, 52(2), 250-260.
- Moser, K., Stanfield, K.M., & Leon, D.A. (2008). Birthweight and gestational age by ethnic group, England and Wales 2005: introducing new data on births. *Health Stat Q*, 39, 22-31.
- Mukherjea, A., Underwood, K.C., Stewart, A.L., Ivery, S.L., & Kanaya, A.M. (2013). Asian Indian views on diet and health in the United States: importance of understanding cultural and social factors to address disparities. *Fam Community Health*, 36(4), 311-323.
- Murashima, M., Hoerr, S.L., Hughes, S.O., & Kaplowitz, S.A. (2012). Feeding behaviors of low-income mothers: Directive control relates to a lower BMI in children, and a nondirective control relates to a healthier diet in preschoolers. *The American Journal of Clinical Nutrition*, 95(5), 1031-1037
- Musher-Eizenman, D.R., Holub, S.C., Hauser, J.C., & Young, K.M. (2007). The Relationship Between Parents' Anti-fat Attitudes and Restrictive Feeding. *Obesity*, 15(8), 2095-2102.
- Must, A., & Strauss, R.S. (1999). Risks and consequences of childhood and adolescent obesity. *International Journal of Obesity*, 23, S2-11.
- Narayan, U. (1995). Eating cultures: Incorporation, identity and Indian food. *Social Identities*, 1(1), 63-86.
- National Health Services (2015). Your health, your choices, how many calories does a child of 7-10 need. Retrieved from: <https://www.nhs.uk/chq/Pages/how-many-calories-do-children-need.aspx>
- Nayak, M.G., Sharada & Geroge, A. (2012) Socio-cultural perspectives on Health and Illness, *Nitte University Journal of Health Sciences*, 2(3), 61- 67.
- Nazroo, J. (1998). Genetic, cultural or socio-economic vulnerability? Explaining ethnic inequalities in health. *Sociology of health and illness*, 20(5), 710-730.

- Nelson, M., Erens, B., & Bates, B. (2007). Low Income Diet and Nutrition Survey: Summary of Key Findings. A Survey Carried Out on Behalf of the Food Standards Agency. London: TSO.
- Nestle, M., Wing, R., Birch, L., Disogra, L., Drewnowski, A., Middleton, S., Sigman-Grant, M., Sobal, J., Winston, M., & Economos, C. (1998). Behavioral and Social Influences on Food Choice. *Nutrition Reviews*, 56(5), 50-64.
- Neumark-Sztainer, D., Bauer, K.W., Friend, S., Hannan, P.J., Story, M., & Berge, J.M. (2010). Family weight talk and dieting: how much do they matter for body dissatisfaction and disordered eating behaviors in adolescent girls?. *Journal of Adolescent Health*, 47(3), 270-276.
- Nicklaus, S., & Remy, E. (2013). Early origins of overeating: tracking between early food habits and later eating patterns. *Current Obesity Reports*, 2(2), 179-184.
- Nightingale, C.M., Rudnicka, A.R., Owen, C.G., Cook, D.G., & Whincup, P.H. (2011). Patterns of body size and adiposity among UK children of South Asian, black African–Caribbean and white European origin: Child Heart And health Study in England (CHASE Study). *International journal of epidemiology*, 40(1), 33-44.
- Nilaweera, I., Doran, F., & Fisher, J. (2014). Prevalence, nature and determinants of postpartum mental health problems among women who have migrated from South Asian to high-income countries: a systematic review of the evidence. *Journal of affective disorders*, 166, 213-226.
- Nohr, E.A., Vaeth, M., Baker, J.L., Sørensen, T.I., Olsen, J., & Rasmussen, K.M. (2008). Combined associations of prepregnancy body mass index and gestational weight gain with the outcome of pregnancy. *The American Journal of Clinical Nutrition*, 87(6), 1750-1759.
- Nordström, K., Coff, C., Jönsson, H., Nordenfelt, L., & Görman, U. (2013). Food and health: Individual, cultural, or scientific matters? *Genes & Nutrition*, 8(4), 357-363.
- Nwadiora, E., & McAdoo, H. (1996). Acculturative stress among Amerasian refugees: Gender and racial differences. *Adolescence*, 31, 477–486.
- O’Cathain, A., Murphy, E., & Nicholl, J. (2007). Why, and how, mixed methods research is undertaken in health services research in England: A mixed methods study. *BMC Health Services Research*, 7, 1, 85.
- O’Dea, J.A. (2008). Gender, ethnicity, culture and social class influences on childhood obesity among Australian schoolchildren: implications for treatment, prevention and community education. *Health & Social Care in the Community*, 16(3), 282-290.

O'Dea, J.A., & Dibley, M.J. (2010). Obesity increase among low SES Australian schoolchildren between 2000 and 2006: Time for preventive interventions to target children from low income schools? *International Journal of Public Health*, 55(3), 185-192.

O'Dea, J.A., & Dibley, M.J. (2014). Prevalence of obesity, overweight and thinness in Australian children and adolescents by socioeconomic status and ethnic/cultural group in 2006 and 2012. *International Journal of Public Health*, 59(5), 819-828.

Office for National Statistics (2011). Ethnicity in the UK: ethnic groups by type of family or household 2011, Retrieved from <https://www.ethnicity-facts-figures.service.gov.uk/ethnicity-in-the-uk/ethnicity-and-type-of-family-or-household>
Office for National Statistics (2017). Internet users in the UK: 2017, Retrieved from: <https://www.ons.gov.uk/businessindustryandtrade/itandinternetindustry/bulletins/internetusers/2017>

Office for National Statistics (2011b). UK Census Data 2011, Retrieved from <https://www.ons.gov.uk/census/2011census>

Office for National Statistics (2016). Overview of UK population, Retrieved from <https://www.gov.uk/government/statistics/overview-of-the-uk-population-feb-2016>
Office for National Statistics (2011a). Postcode area database. National Statistics Postcode Lookup UK. Retrieved from <https://data.gov.uk/dataset/national-statistics-postcode-lookup-uk>

Ogbu, J.U. (1981). Origins of human competence: A cultural-ecological perspective. *Child Development*, 52, (2), 413-42.

Ogden, J. (2011). *The Psychology of Eating: From Healthy to Disordered Behavior*. Hoboken: Wiley.

Ogden, J., Reynolds, R., & Smith, A. (2006). Expanding the concept of parental control: A role for overt and covert control in childrens snacking behaviour? *Appetite*, 47(1), 100-106.

Ogden, J., Cordey, P., Cutler, L., & Thomas, H. (2013). Parental restriction and children's diets. The chocolate coin and Easter egg experiments. *Appetite*, 61, 36-44.

Ogden, C.L., Carroll, M.D., Curtin, L.R., Mcdowell, M.A., Tabak, C.J., & Flegal, K.M. (2006). Prevalence of Overweight and Obesity in the United States, 1999-2004. *JAMA*, 295(13), 1549.

Olvera, N., & Power, T.G. (2010). Parenting styles and obesity in Mexican American children: A longitudinal study. *Journal of Pediatric Psychology*, 35(3), 243-249.

O'Rahilly, S., & Farooqi, I.S. (2006). Genetics of obesity. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, 361(1471), 1095-1105.

- Orji, R., Vassileva, J., & Mandryk, R. (2012). Towards an Effective Health Interventions Design: An Extension of the Health Belief Model. *Online Journal of Public Health Informatics*, 4(3).
- Orrell-Valente, J.K., Hill, L.G., Brechwald, W.A., Dodge, K.A., Pettit, G.S., & Bates, J.E. (2007). "Just three more bites": An observational analysis of parents' socialization of childrens eating at mealtime. *Appetite*, 48(1), 37-45.
- Otero-Sabogal, R., Sabogal, F., Perez-Stable, E., & Hiatt, R. (1995). Dietary Practices, Alcohol Consumption, and Smoking Behavior: Ethnic, Sex, and Acculturation Differences. *Journal of the National Cancer Institute Monographs*, 18, 73-82.
- Owen, C.G., Nightingale, C.M., Rudnicka, A.R., Cook, D.G., Ekelund, U., & Whincup, P.H. (2009a). Ethnic and gender differences in physical activity levels among 9–10-year-old children of white European, South Asian and African–Caribbean origin: the Child Heart Health Study in England (CHASE Study), *International journal of epidemiology*, 38(4), 1082-1093.
- Owen, C.G., Whincup, P.H., Orfei, L., Chou, Q., Rudnicka, A.R., Wathern, A.K., Cook, D.G. (2009b). Is body mass index before middle age related to coronary heart disease risk in later life? Evidence from observational studies. *International Journal of Obesity*, 33(8), 866-877.
- Pai, H.L., & Contento, I. (2014). Parental perceptions, feeding practices, feeding styles, and level of acculturation of Chinese Americans in relation to their school-age child's weight status. *Appetite*, 80, 174-182.
- Palfreyman, Z., Haycraft, E., & Meyer, C. (2012). Development of the Parental Modelling of Eating Behaviours Scale (PARM): links with food intake among children and their mothers. *Maternal & Child Nutrition*, 10(4), 617-629.
- Pallan, M., Parry, J., & Adab, P. (2012). Contextual influences on the development of obesity in children: A case study of UK South Asian communities. *Preventive Medicine*, 54(3-4), 205-211.
- Palmer, G., & Kenway, P. (2007). Poverty Rates Among Ethnic Minorities in Great Britain, York: Joseph Rowntree Foundation.
- Paradise, A.W., & Kernis, M.H. (2002). Self-esteem and Psychological Well-being: Implications of Fragile Self-esteem. *Journal of Social and Clinical Psychology*, 21(4), 345-361.
- Park, H., & Bauer, S. (2002). Parenting practices, ethnicity, socioeconomic status and academic achievement in adolescents. *School Psychology International*, 23, 386–397.
- Park, M.H., Falconer, C., Viner, R.M., & Kinra, S. (2012). The impact of childhood obesity on morbidity and mortality in adulthood: A systematic review. *Obesity Reviews*, 13(11), 985-1000.

- Park, Y.S., Kim, B.S., Chiang, J., & Ju, C.M. (2010). Acculturation, enculturation, parental adherence to Asian cultural values, parenting styles, and family conflict among Asian American college students. *Asian American Journal of Psychology*, 1(1), 67-79.
- Pasch, L.A., Penilla, C., Tschann, J.M., Martinez, S.M., Deardorff, J., Groat, C.L., & Greenspan, L.C. (2016). Preferred Child Body Size and Parental Underestimation of Child Weight in Mexican-American Families. *Maternal and Child Health Journal*, 20(9), 1842-1848.
- Patel, M., Phillips-Caesar, E., & Boutin-Foster, C. (2012). Barriers to lifestyle behavioral change in migrant South Asian populations. *Journal of Immigrant Minority Health*, 14(5), 774-785.
- Patrick, H. & Nicklas, T.A. (2005). A review of family and social determinants of children's eating patterns and diet quality. *Journal of the American College of Nutrition*, 24(2), 83-92.
- Patrick, H., Hennessy, E., McSpadden, K., & Oh, A. (2013). Parenting styles and practices in children's obesogenic behaviors. Scientific gaps and future research directions. *Childhood Obesity*, 9(s1), S73-86.
- Patrick, H., Nicklas, T.A., Hughes, S.O., & Morales, M. (2005). The benefits of authoritative feeding style: caregiver feeding styles in a child feeding context. *Appetite*, 44, 83 – 92.
- Patton, M.Q. (2002). *Qualitative research and evaluation methods*. Estados Unidos: Sage Publications.
- Pelaez, M., Field, T., Pickens, J.N., & Hart, S. (2008). Disengaged and authoritarian parenting behavior of depressed mothers with their toddlers. *Infant Behavior and Development*, 31, 145–148.
- Penn, R., & Lambert, P. (2002). Attitudes towards ideal family size of different ethnic/nationality groups in Great Britain, France and Germany. *Population Trends*, 108, 49-58.
- Penrod, J., Preston, D., Cain, R., & Starks, M. (2003). A discussion of chain referral as a method of sampling hard-to-reach populations. *Journal of Transcultural Nursing*, 14(2), 100-107.
- Peterson, K. E., Sorensen, G., Pearson, M., Hebert, J. R., Gottlieb, B. R. & McCormick, M. C. (2002). Design of an intervention addressing multiple levels of influence on dietary and activity patterns in low-income, postpartum women. *Health Education Research*, 17, 531–540.
- Pieroni, A., Houlihan, L., Ansari, N., Hussain, B., & Aslam, S. (2007). Medicinal perceptions of vegetables traditionally consumed by South-Asian migrants living in Bradford, Northern England. *Journal of Ethnopharmacology*, 113(1), 100-110.

- Pinquart, M. (2014). Associations of General Parenting and Parent–Child Relationship with Pediatric Obesity: A Meta-Analysis. *Journal of Pediatric Psychology*, 39(4), 381-393.
- Pittman, L.D., & Chase-Lansdale, P.L. (2001). African American adolescent girls in impoverished communities: Parenting style and adolescent outcomes. *Journal of research on adolescence*, 11(2), 199-224.
- Platt, L. (2007). *Poverty and ethnicity in the UK*. Bristol: The Policy Press.
- Popkin, B.M., & Udry, J.R. (1998). Adolescent obesity increases significantly in second and third generation US immigrants: the National Longitudinal Study of Adolescent Health, *The Journal of Nutrition*, 128(4), 701-706.
- Power, C., Lake, J.K., & Cole, T.J. (1997). Review: Measurement and long-term health risks of child and adolescent fatness. *International Journal of Obesity*, 21(7), 507-526.
- Power, T.G., O'Connor, T.M., Fisher, J.O., & Hughes, S.O. (2015). Obesity Risk in Children: The Role of Acculturation in the Feeding Practices and Styles of Low-Income Hispanic Families. *Childhood Obesity*, 11(6), 715-721.
- Power, M., Uphoff, E.P., Stewart-Knox, B., Small, N., Doherty, B., & Pickett, K.E. (2017). Food insecurity and socio-demographic characteristics in two UK ethnic groups: an analysis of women in the Born in Bradford cohort. *Journal of Public Health*, 1-9.
- Prentice, A.M., & Jebb, S.A. (2001). "Beyond Body Mass Index." *Obesity Reviews*, 2(3), 141-147.
- Public Health England (2017). National Child Measurement Programme: Changes in children's body mass index between 2006/07 and 2015/16, summary of main findings. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/646272/national_child_measurement_programme_changes_in_BMI_summary.pdf
- Public Health Wales NHS Trust (2017). Child Measurement Programme for Wales 2015/16. Retrieved from <http://www.wales.nhs.uk/sitesplus/888/page/67795>
- Puhl, R.M., & Latner, J.D. (2007). Stigma, obesity, and the health of the nation's children. *Psychol Bull*, 133, 557-580.
- Pursey, K., Burrows, T.L., Stanwell, P., & Collins, C.E. (2014). How Accurate is Web-Based Self-Reported Height, Weight, and Body Mass Index in Young Adults? *Journal of Medical Internet Research*, 16(1).
- Quay, T. A., Frimer, L., Janssen, P. A., & Lamers, Y. (2017). Barriers and facilitators to recruitment of South Asians to health research: A scoping review. *BMJ Open*, 7(5):e014889.

- Raaijmakers, L.G., Gevers, D.W., Teuscher, D., Kremers, S.P., & van Assema, P.V. (2014). Emotional and instrumental feeding practices of Dutch mothers regarding foods eaten between main meals. *BMC public health*, 14, 171.
- Radziszewska, B., Richardson, J.L., Dent, C.W., & Flay, B.R. (1996). Parenting style and adolescent depressive symptoms, smoking, and academic achievement: Ethnic, gender, and SES differences. *Journal of behavioral medicine*, 19(3), 289-305.
- Raudsepp, L., & Viira, R. (2000). Influence of Parents' and Siblings' Physical Activity on Activity Levels of Adolescents. *European Journal of Physical Education*, 5(2), 169-178.
- Read, L.C., Penttila, I.A., Howarth, G.S., Clarke, J.M., & Regester, G.O. (2002). Role and function of growth factors in infant nutrition. *Infant Formula: Closer to*, 37.
- Reagan, P., & Hersch, J. (2005). Influence of race, gender, and socioeconomic status on binge eating frequency in a population-based sample. *International Journal of Eating Disorders*, 38, 252-256.
- Reddy, S.D., & Crowther, J.H. (2007). Teasing, acculturation, and cultural conflict: psychosocial correlates of body image and eating attitudes among South Asian women. *Cultural Diversity and Ethnic Minority Psychology*, 13(1), 45.
- Redline, S., Tishler, P., Schluchter, M., Aylor, J., Clark, K., & Graham, G. (1999). Risk Factors for Sleep-disordered Breathing in Children. *American Journal of Respiratory and Critical Care Medicine*, 159(5), 1527-1532.
- Redmond, R., & Curtis, E. (2009). Focus groups: principles and process. *Nurse Researcher*, 16(3), 57-69.
- Rees, G.A., Doyle, W., Srivastava, A., Brooke, Z.M., Crawford, M.A., & Costeloe, K.L. (2005). The nutrient intakes of mothers of low birth weight babies - a comparison of ethnic groups in East London, UK. *Maternal and Child Nutrition*, 1(2), 91-99.
- Rees, S.D., Islam, M., Hydrie, M.Z., Chaudhary, B., Bellary, S., Hashmi, S., Jafar, T.H. (2011). An FTO variant is associated with Type 2 diabetes in South Asian populations after accounting for body mass index and waist circumference. *Diabetic Medicine*, 28(6), 673-680.
- Reeves, E.A., & Woods-Giscombé, C.L. (2015). Infant-feeding practices among African American women: Social-ecological analysis and implications for practice. *Journal of Transcultural Nursing*, 26(3), 219-226.
- Reeves, S., Kuper, A., Hodges, B.D. (2008). Qualitative research methodologies: ethnography, *Bmj*; 337.
- Reid, T.R. (2010). The healing of America: a global quest for better, cheaper, and fairer health care. Penguin, New York, NY.

- Reilly, J.J., & Kelly, J. (2011). Long-term impact of overweight and obesity in childhood and adolescence on morbidity and premature mortality in adulthood: Systematic review. *International Journal of Obesity*, 35(7), 891-898.
- Reilly, J.J., Methven, E., McDowell, Z.C., Hacking, B., Alexander, D., Stewart, L., Kelnar, C.J. (2003). Health consequences of obesity, *Arch Dis Child*, 88, 748–752.
- Reimer, K., Smith, C., Reicks, M., Henry, H., Thomas, R., & Atwell, J. (2004). Child-feeding strategies of African American women according to stage of change for fruit and vegetable consumption, *Public Health Nutrition*, 7(04).
- Rhee, K.E., Lumeng, J.C., Appugliese, D.P., Kaciroti, N., & Bradley, R.H. (2006). Parenting styles and overweight status in first grade. *Pediatrics*, 117, 2047 – 2054.
- Richards, R., & Smith, C. (2007). Environmental, parental, and personal influences on food choice, access, and overweight status among homeless children. *Social Science and Medicine*, 65, 1572-1583.
- Roberts, K., Cavill, N., & Rutter, H. (2009) Standard Evaluation Framework for weight management interventions. National Obesity Observatory. Retrieved from <http://affinityhealthhub.co.uk/storage/app/attachments/noo-standard-evaluation-framework-for-weight-management-interventions-1488560094.pdf>
- Robinson, S. (2011). A link between maternal can childhood obesity. In D. Bagchi, (Eds). *Global perspectives on childhood obesity currents status, consequences and prevention* (1st ed.). Academic Press, Elsevier. London.
- Robinson, E., & Sutin, A. R. (2017). Parents' Perceptions of Their Children as Overweight and Children's Weight Concerns and Weight Gain. *Psychological Science*, 28(3), 320-329.
- Robinson, T., Kiernan, M., Matheson, D., & Haydel, K. (2001). Is parental control over children's eating associated with childhood obesity? Results from a population based sample of third graders. *Obesity Research*, 9, 306 – 312.
- Rodbard, H.W., Fox, K.M., & Grandy, S. (2009). Impact of Obesity on Work Productivity and Role Disability in Individuals with and at Risk for Diabetes Mellitus. *American Journal of Health Promotion*, 23(5), 353-360.
- Rodgers, R.F., Paxton, S.J., Massey, R., Campbell, K.J., Wertheim, E.H., Skouteris, H., & Gibbons, K. (2013a). Maternal feeding practices predict weight gain and obesogenic eating behaviors in young children: a prospective study. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 24
- Rodgers, R.F., Paxton, S.J., McLean, S.A., Campbell, K.J., Wertheim, E.H., Skouteris, H., & Gibbons, K. (2013b). Do maternal body dissatisfaction and dietary restraint predict weight gain in young pre-school children? A 1-year follow-up study. *Appetite*, 67, 30-36.

- Rollins, B.Y., Loken, E., Savage, J.S., & Birch, L.L. (2013). Maternal controlling feeding practices and girls' inhibitory control interact to predict changes in BMI and eating in the absence of hunger from 5 to 7 y. *The American journal of clinical nutrition*, 99(2), 249-257.
- Rolls, B.J., Row, L.S. & Meengs, J.S. (2006). Larger portion sizes lead to a sustained increase in energy intake over 2 days. *Journal of the American Dietetic Association*, 104, 367-72.
- Romano, V., & Scott, I. (2014). Using Health Belief Model to Reduce Obesity Amongst African American and Hispanic Populations. *Procedia - Social and Behavioral Sciences*, 159, 707-711.
- Rosas, L.G., Harley, K.G., Guendelman, S., Fernald, L.C., Mejia, F., & Eskenazi, B. (2010). Maternal perception of child weight among Mexicans in California and Mexico. *Maternal and child health journal*, 14(6), 886-894.
- Rosenberg, T.J., Garbers, S., Chavkin, W., & Chiasson, M.A. (2003). Prepregnancy weight and adverse perinatal outcomes in an ethnically diverse population. *Obstetrics and Gynecology*, 102(5), 1022-1027.
- Rosenkranz, R.R., & Dzewaltowski, D.A. (2008). Model of the home food environment pertaining to childhood obesity. *Nutrition Reviews*, 66(3), 123-140.
- Rosenstock, I. (1974). Historical origins of the Health Belief Model. *Health Education Monographs*, 2, 328-335.
- Rosenstock, I.M., Strecher, V.J., Becker, M.H. (1988). Social learning theory and the health belief model. *Health Education Quarterly*, 15, 175-183.
- Rothon, C., Head, J., Klineberg, E., & Stansfeld, S. (2011). Can social support protect bullied adolescents from adverse outcomes? A prospective study on the effects of bullying on the educational achievement and mental health of adolescents at secondary schools in East London. *Journal of Adolescence*, 34(3), 579-588.
- Sacco, L.M., Bentley, M.E., Carby-Shields, K., Borja, J.B., & Goldman, B.D. (2007). Assessment of infant feeding styles among low-income African-American mothers: comparing reported and observed behaviors. *Appetite*, 49(1), 131-140.
- Sacher, P.M., Kolotourou, M., Chadwick, P.M., Cole, T.J., Lawson, M.S., Lucas, A., & Singhal, A. (2010). Randomized Controlled Trial of the MEND Program: A Family-based Community Intervention for Childhood Obesity. *Obesity*, 18(1), S62-68.
- Sahi Iyer, D., & Haslam, N. (2003). Body image and eating disturbance among south Asian-American women: The role of racial teasing. *International Journal of Eating Disorders*, 34(1), 142-147.

- Sahoo, K., Sahoo, B., Choudhury, A.K., Sofi, N.Y., Kumar, R. & Bhadoria, A.S. (2015). Childhood obesity: causes and consequences. *J Family Med Prim Care*, 4, 187-92.
- Saks, M., & Allsop, J. (2012). *Researching Health. Qualitative, Quantitative and Mixed Methods*. Thousand Oaks (CA) London: Sage.
- Salant, T., & Lauderdale, D. S. (2003). Measuring culture: A critical review of acculturation and health in Asian immigrant populations. *Social Science & Medicine*, 57(1), 71-90.
- Salsberry, P.J., & Reagan, P.B. (2007). Taking the long view: the prenatal environment and early adolescent overweight. *Research in nursing & health*, 30(3), 297-307.
- Salvo, D., Frediani, J.K., Ziegler, T.R., & Cole, C.R. (2012), Food group intake patterns and nutrient intake vary across low-income Hispanic and African American preschool children in Atlanta: a cross sectional study. *Nutrition Journal*, 11, 62.
- Sanchez, A.M., Reed, D.R., Price, R.A. (2000). Reduced mortality associated with body mass index (BMI) in African Americans relative to Caucasians. *Ethnicity and Disease*, 10, 24-30.
- Sandelowski, M. (2000). Focus on research methods-whatever happened to qualitative description?. *Research in nursing and health*, 23(4), 334-340.
- Sandelowski, M. (2010). What's in a name? Qualitative description revisited. *Research in nursing & health*, 33(1), 77-84.
- Santiago-Torres, M., Adams, A.K., Carrel, A.L., LaRowe, T.L., & Schoeller, D.A. (2014). Home food availability, parental dietary intake, and familial eating habits influence the diet quality of urban Hispanic children. *Childhood Obesity*, 10(5), 408-415.
- Savage, J.S., Fisher, J.O., & Birch, L.L. (2007). Parental Influence on Eating Behavior: Conception to Adolescence. *The Journal of Law, Medicine & Ethics*, 35(1), 22-34.
- Savitz, D.A., Janevic, T.M., Engel, S.M., Kaufman, J.S., & Herring, A.H. (2008). Ethnicity and gestational diabetes in New York City, 1995–2003, *BJOG: An International Journal of Obstetrics & Gynaecology*, 115(8), 969-978.
- Saxena, S., Ambler, G., Cole, T.J., & Majeed, A. (2004), Ethnic group differences in overweight and obese children and young people in England: cross sectional survey. *Archives of Disease in Childhood*, 89(1), 30-36.
- Saxton, J., Carnell, S., Jaarsveld, C.H., & Wardle, J. (2009). Maternal Education Is Associated with Feeding Style. *Journal of the American Dietetic Association*, 109(5), 894-898.

- Seach, K.A., Dharmage, S.C., Lowe, A.J., & Dixon, J.B. (2010). Delayed introduction of solid feeding reduces child overweight and obesity at 10 years. *International Journal of Obesity*, 34(10), 1475-1479.
- Seale, C., & Silverman, D. (1997). Ensuring rigour in qualitative research. *The European Journal of Public Health*, 7(4), 379-384.
- Scaglioni, S., Arrizza, C., Vecchi, F., & Tedeschi, S. (2011). Determinants of children's eating behavior. *The American Journal of Clinical Nutrition*, 94(6), 2006S-2011S.
- Scarborough, P., Bhatnagar, P., Wickramasinghe, K.K., Allender, S., Foster, C., Rayner, M. (2011). The economic burden of ill health due to diet, physical inactivity, smoking, alcohol and obesity in the UK: an update to 2006–07 NHS costs. *J. Public Health*, 33(4), 527–535.
- Scholl, T.O., & Chen, X. (2009). Vitamin D intake during pregnancy: Association with maternal characteristics and infant birth weight. *Early Human Development*, 85(4), 231-234.
- Schreier, H.M., Chen, E. (2013). Socioeconomic status and the health of youth: A multilevel, multidomain approach to conceptualizing pathways. *Psychological Bulletin*, 139(3), M, 606-654.
- Schwimmer, J. B., Burwinkle, T.M., Varni, J. W.(2003). Health-Related Quality of Life of Severely Obese Children and Adolescents. *JAMA*, 289(14), 1813-1819.
- Scuteri, A., Sanna, S., Chen, W., Uda, M., Albai, G., Strait, J., Abecasis, G.R. (2007). Genome-Wide Association Scan Shows Genetic Variants in the FTO Gene Are Associated with Obesity-Related Traits. *PLoS Genetics*, 3(7), e115.
- Shaikh, U., & Ahmed, O. (2006). Islam and infant feeding. *Breastfeeding Medicine*, 1, 164–167.
- Shariff, A. (2009). Ethnic identity and parenting stress in South Asian families: Implications for culturally sensitive counselling. *Canadian Journal of Counselling*, 43(1), 35–46.
- Shaw, N.J., Crabtree, N.J., Kibirige, M.S., & Fordham, J.N. (2007). Ethnic and gender differences in body fat in British schoolchildren as measured by DXA. *Archives of Disease in Childhood*, 92, 872-875.
- Sheikh, S., & Furnham, A. (2000). A cross-cultural study of mental health beliefs and attitudes towards seeking professional help. *Social Psychiatry and Psychiatric Epidemiology*, 35(7), 326-334.
- Sheikh, N., & Thomas, J. (1994). Factors Influencing Food Choice among Ethnic Minority Adolescents, *Nutrition & Food Science*, 4, 18-22.

- Sherry, B., Mcdivitt, J., Birch, L.L., Cook, F.H., Sanders, S., Prish, J.L., & Scanlon, K.S. (2004). Attitudes, practices, and concerns about child feeding and child weight status among socioeconomically diverse white, Hispanic, and African-American mothers. *Journal of the American Dietetic Association*, 104(2), 215-221.
- Shinozaki, K., & Okuda, M. (2012). The effects of fat mass and obesity-associated gene variants on the body mass index among ethnic groups and in children and adults. *Indian Journal of Endocrinology and Metabolism*, 16(9), 588.
- Shloim, N., Edelson, L.R., Martin, N., & Hetherington, M.M. (2015). Parenting Styles, Feeding Styles, Feeding Practices, and Weight Status in 4–12 Year-Old Children: A Systematic Review of the Literature. *Frontiers in Psychology*, 6.
- Shrewsbury, V., & Wardle, J. (2008). Socioeconomic Status and Adiposity in Childhood: A Systematic Review of Cross-sectional Studies 1990–2005. *Obesity*, 16(2), 275-284.
- Shucksmith, J., Hendry, L., & Glendinning, A. (1995). Models of parenting: Implications for adolescent well-being within different types of family contexts. *Journal of Adolescence*, 18,253–270.
- Silverman, B.L., Rizzo, T.A., Cho, N.H., & Metzger, B.E. (1998). Long-term effects of the intrauterine environment. The Northwestern University Diabetes in Pregnancy Center. *Diabetes Care*, 21(2), 142–149.
- Simkiss, D. (2014). Inequalities in children's health in the UK. *Paediatrics and Child Health*, 24(3),103-109.
- Simmonds, M., Llewellyn, A., Owen, C.G., & Woolacott, N. (2016). Predicting adult obesity from childhood obesity: A systematic review and meta-analysis. *Obesity Reviews*, 17(2), 95-107.
- Singer, K., & Lumeng, C.N. (2017). The initiation of metabolic inflammation in childhood obesity. *Journal of Clinical Investigation*, 127(1), 65-73.
- Singh, G.K., Kogan, M.D., Van Dyck, P.C., & Siahpush, M. (2008). Racial/ethnic, socioeconomic, and behavioural determinants of childhood and adolescent obesity in the United States: analyzing independent and joint associations. *Annals of Epidemiology*, 18(9), 682-695.
- Singh, G.K., Yu, S.M., Siahpush, M., & Kogan, M.D. (2008). High Levels of Physical Inactivity and Sedentary Behaviors Among US Immigrant Children and Adolescents. *Archives of Pediatrics & Adolescent Medicine*, 162(8), 756.
- Singhal, A., & Lanigan, J. (2007). Breastfeeding, early growth and later obesity. *Obesity reviews*, 8(s1), 51-54.

- Skala, K., Chuang, R.J., Evans, A., Hedberg, A.M., Dave, J., & Sharma, S. (2012). Ethnic differences in the home food environment and parental food practices among families of low-income Hispanic and African-American preschoolers. *Journal of Immigrant and Minority Health*, 14(6), 1014-1022.
- Skelton, J. A., Busey, S. L., & Havens, P. L. (2006). Weight and health status of inner city African American children: Perceptions of children and their parents. *Body Image*, 3(3), 289-293.
- Skelton, J. A., Buehler, C., Irby, M. B., & Grzywacz, J. G. (2012). Where are family theories in family-based obesity treatment?: Conceptualizing the study of families in pediatric weight management. *International Journal of Obesity*, 36(7), 891-900.
- Sleddens, E.F., Kremers, S.P., & Thijs, C. (2008). The Children's Eating Behaviour Questionnaire: factorial validity and association with Body Mass Index in Dutch children aged 6–7. *International Journal of Behavioral Nutrition and Physical Activity*, 5(1), 49.
- Sleddens, E.F., Gerards, S.M., Thijs, C., de Vries, N.K., & Kremers, S.P. (2011). General parenting, childhood overweight and obesity-inducing behaviors. A review. *International Journal of Pediatric Obesity*, 6(2), e12–e27.
- Small, L., Melnyk, B.M., Anderson-Gifford, D. & Hampl, J.S. (2009), Exploring the meaning of excess child weight and health: shared viewpoints of Mexican parents of preschool children. *Pediatric Nursing*, 35(6), 357-366.
- Smith, N.R., Kelly, Y.J., & Nazroo, J.Y. (2011). The effects of acculturation on obesity rates in ethnic minorities in England: evidence from the Health Survey for England. *The European Journal of Public Health*, 22(4), 508-513.
- Smith, S.M., Craig, L.C., Raja, A.E., McNeill, G., & Turner, S.W. (2013). Growing up before growing out: secular trends in height, weight and obesity in 5–6-year-old children born between 1970 and 2006. *Archives of Disease in Childhood*, 98(4), 269–273.
- Smith, J., Cianflone, K., Biron, S., Hould, F.S., Lebel, S., Marceau, S., & Marceau, P. (2009). Effects of maternal surgical weight loss in mothers on intergenerational transmission of obesity. *Journal of Clinical Endocrinology & Metabolism*, 94(11), 4275-4283.
- Snethen, J.A., Hewitt, J.B., & Goretzke, M. (2007). Childhood obesity: the infancy connection. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 36(5), 501-510.
- Sniderman, A.D., Bhopal, R., Prabhakaran, D., Sarrafzadegan, N., & Tchernof, A. (2007). Why might South Asians be so susceptible to central obesity and its atherogenic consequences? The adipose tissue overflow hypothesis. *International Journal of Epidemiology*, 36(1), 220-225.

- Snoek, H.M., Strien, T.V., Janssens, J.M., & Engels, R.C. (2007). Emotional, external, restrained eating and overweight in Dutch adolescents. *Scandinavian Journal of Psychology*, 48(1), 23-32.
- Sobal, J. (2001). Social and cultural influences on obesity. In P. Bjorntorp (Ed). *International textbook of obesity* (pp 305-322). London: John Wiley and Sons.
- Sonuga-Barke, E., & Mistry, M. (2000). The effect of extended family living on the mental health of three generations within two Asian communities. *British Journal of Clinical Psychology*, 39(2), 129-141.
- Sonuga-Barke, E., Mistry, M., & Qureshi, S. (1998). The mental health of Muslim mothers in extended families: The impact of intergenerational disagreement on anxiety and depression. *British Journal of Clinical Psychology*, 37, 399-408.
- Sosa, E., Mckyer, E. L., Goodson, P., & Castillo, L. (2014). Mexican American Mothers' Perceptions of their Role in Childhood Obesity Prevention: A Qualitative Study. *Journal of Research in Obesity*, 1-10.
- Spencer, S. (2014). *Race and Ethnicity: Culture, identity and representation*. London & New York: Routledge.
- Springer, A.E., Lewis, K., Kelder, S.H., Fernandez, M.E., Barroso, C.S., & Hoelscher, D.M. (2009). Physical Activity Participation by Parental Language Use in 4th, 8th, and 11th Grade Students in Texas, USA. *Journal of Immigrant and Minority Health*, 12(5), 769-780.
- Sproston, K., & Mindell, J. (2006). Health Survey for England 2004. The Health of Minority Ethnic Groups, The Information Centre: London. Retrieved from <https://digital.nhs.uk/catalogue/PUB01170>
- Spruijt-Metz, D., Li, C., Cohen, E., Birch, L.L., & Goran, M.I. (2006). The longitudinal influence of mother's child-feeding practices on adiposity in children. *Journal of Pediatrics*, 148, 314-320.
- Spruijt-Metz, D., Lindquist, C.H., Birch, L.L., Fisher, J.O., & Goran, M.I. (2002). Relation between mothers' child-feeding practices and children's adiposity. *The American journal of clinical nutrition*, 75(3), 581-586.
- Sriskantharajah, J., & Kai, J. (2006). Promoting physical activity among South Asian women with coronary heart disease and diabetes: what might help? *Family Practice*, 24(1), 71-76.
- Stajcic, N. (2013). Understanding Culture: Food as a Means of Communication. *Studies on Cultures and Societies, Hemispheres*, 28, 5-14.
- Stamatakis, E., Wardle, J., & Cole, T.J. (2009). Childhood obesity and overweight prevalence trends in England: Evidence for growing socioeconomic disparities. *International Journal of Obesity*, 34(1), 41-47.

- Stang, J., & Loth, K.A. (2011). Parenting style and child feeding practices: Potential mitigating factors in the etiology of childhood obesity. *American Dietetic Association*, 111, 1301-1305.
- Steer, P., Alam, M. A., Wadsworth, J., & Welch, A. (1995). Relation between maternal haemoglobin concentration and birth weight in different ethnic groups. *Bmj*, 310(6978), 489-491.
- Steinberger, J., & Daniels, S.R. (2003). Obesity, insulin resistance, diabetes, and cardiovascular risk in children: an American Heart Association scientific statement from the Atherosclerosis, Hypertension, and Obesity in the Young Committee (Council on Cardiovascular Disease in the Young) and the Diabetes Committee (Council on Nutrition, Physical Activity, and Metabolism). *Circulation*, 107, 1448–1453.
- Steinberg, L., Lamborn, D.S., Dornbusch, S.M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development*, 63, 1266-1281.
- Stevens, J., Plankey, M.W., Williamson, D.F., Thun, M. J., Rust, P.F., Palesch, Y., & Oneil, P.M. (1998). The Body Mass Index-Mortality Relationship in White and African American Women. *Obesity Research*, 6(4), 268-277.
- Stokes, L., Rolfe, H., & Hudson-Sharp, N. (2015). A compendium of evidence on ethnic minority resilience to the effects of deprivation on attainment. National Institute of Economic and Social Research. Department for Education. Retrieved from http://cdn.basw.co.uk/upload/basw_33319-9.pdf
- Strauss, R., & Knight, J. (1999). Influence of the home environment on the development of obesity in children. *Pediatrics*, 103(6), e85.
- Stunkard, A.J., & Messick, S. (1985). The three-factor eating questionnaire to measure dietary restraint, disinhibition and hunger. *Journal of Psychosomatic Research*, 29(1), 71-83.
- Stunkard, A.J., Sorenson, T.I.A., Hanis, C, Teasdale, T.W, Chakraborty, R., Schull, W.H., & Shulsinger, F. (1986). An adoption study of human obesity. *New England Journal of Medicine*, 314, 193-198.
- Swinburn, B., Caterson, I., Seidell, J., & James, W. (2004). Diet, nutrition and the prevention of excess weight gain and obesity. *Public Health Nutrition*, 7(1A), 123–146.
- Tamayo, T., Herder, C., & Rathmann, W. (2010). Impact of early psychosocial factors (childhood socioeconomic factors and adversities) on future risk of type 2 diabetes, metabolic disturbances and obesity: A systematic review. *BMC Public Health*, 10(1), 525-528.

- Tan, C.C., & Holub, S.C. (2015). Emotion Regulation Feeding Practices Link Parents' Emotional Eating to Children's Emotional Eating: A Moderated Mediation Study. *Journal of Pediatric Psychology*, 40(7), 657-663
- Tanner, J.M., & Whitehouse, R.H. (1975). Revised standards for triceps and subscapular skinfold in British children. *Arch Dis Child*, 50, 142-5.
- Tanofsky-Kraff, M., Han, J.C., Anandalingam, K., Shomaker, L.B., Columbo, K.M., Wolkoff, L.E., & Yanovski, J.A. et al. (2009). The FTO gene rs9939609 obesity-risk allele and loss of control over eating. *The American journal of clinical nutrition*, 90(6), 1483-1488.
- Tate, A.R., Dezaux, C., & Cole, T.J. (2006). Is infant growth changing? *International Journal of Obesity*, 30(7), 1094-1096.
- Tavassolie, T., Dudding, S., Madigan, A.L., Thorvardarson, E., & Winsler, A. (2016). Differences in perceived parenting style between mothers and fathers: Implications for child outcomes and marital conflict. *Journal of Child and Family Studies*, 25, 2055- 2068.
- Taveras, E.M., Gillman, M.W., Kleinman, K., Rich-Edwards, J.W., & Rifas-Shiman, S.L. (2010), Racial/ethnic differences in early-life risk factors for childhood obesity. *Pediatrics*, 125(4), 686-695.
- Taveras, E.M., Rifas-Shiman, S.L., Sherry, B., Oken, E., Haines, J., Kleinman, K., Rich-Edwards, J.W., & Gillman, M.W. (2011). Crossing growth percentiles in infancy and risk of obesity in childhood. *Arch Pediatr Adolesc Med*, 165, 993–8.
- Taylor, R.W., Williams, S.M., Fangupo, L.J., Wheeler, B.J., Taylor, B.J., Daniels, L., & Davies, R.S. (2017). Effect of a baby-led approach to complementary feeding on infant growth and overweight: a randomized clinical trial. *JAMA pediatrics*, 171(9), 838-846.
- Teddlie, C., & Tashakkori, A. (2003). Major issues and controversies in the use of mixed methods in the social and behavioral sciences. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 3-50). Thousand Oaks, CA: Sage.
- Tharner, A., Jansen, P.W., Kiefte-de Jong, J.C., Moll, H.A., van der Ende, J., Jaddoe, V.W., & Franco, O.H. (2014). Toward an operative diagnosis of fussy/picky eating: a latent profile approach in a population-based cohort. *International Journal of Behavioral Nutrition and Physical Activity*, 11(1), 14-24.
- Tholin, S., Rasmussen, F., Tynelius, P., & Karlsson, J. (2005). Genetic and environmental influences on eating behavior: The Swedish Young Male Twins Study. *The American Journal of Clinical Nutrition*, 81(3), 564-569.
- Thomas, M., & Avery, V. (1997). Infant feeding in Asian families: early feeding practices and growth. The Stationery Office, London.

- Thomas, E., & Magilvy, J.K. (2011). Qualitative Rigor or Research Validity in Qualitative Research. *Journal for Specialists in Pediatric Nursing*, 16(2), 151-155.
- Thomson, M. D., & Hoffman-Goetz, L. (2009). Defining and measuring acculturation: A systematic review of public health studies with Hispanic populations in the United States. *Social Science & Medicine*, 69(7), 983-991.
- Tiggemann, M. & Lowes, J. (2002). Predictors of maternal control over children's eating behaviour. *Appetite*, 39, 1 – 7.
- Tiggemann, M., & Lynch, J.E. (2001). Body image across the life span in adult women: The role of self-objectification. *Developmental Psychology*, 37(2), 243-253.
- Tohill, B.C. (2005). Dietary intake of fruit and vegetables and management of body weight. Geneva, Switzerland: World Health Organization.
- Toschke, A.M., Grote, V., Koletzko, B., & von Kries, R. (2004). Identifying children at high risk for overweight at school entry by weight gain during the first 2 years. *Archives of pediatrics & adolescent medicine*, 158(5), 449-452.
- Townsend, E., & Pitchford, N.J. (2012). Baby knows best? The impact of weaning style on food preferences and body mass index in early childhood in a case–controlled sample. *BMJ Open*, 2(1), e000298.
- Traviss, G.D., West, R.M., & House, A.O. (2012). Maternal Mental Health and Its Association with Infant Growth at 6 Months in Ethnic Groups: Results from the Born-in-Bradford Birth Cohort Study. *PLoS ONE*, 7(2).
- Trigwell, J., Watson, P., Murphy, R., Stratton, G., & Cable, N. (2013). Ethnic differences in parental attitudes and beliefs about being overweight in childhood. *Health Education Journal*, 73(2), 179-191.
- Truby, H., & Paxton, S.J. (2002). Development of the Children's Body Image Scale. *British Journal of Clinical Psychology*, 41, 185–204.
- Truby, H., & Paxton, S.J. (2008). The Children's Body Image Scale: Reliability and use with international standards for body mass index. *British Journal of Clinical Psychology*, 47(1), 119-124.
- Truong, M., Paradies, Y., & Priest, N. (2014). Interventions to improve cultural competency in healthcare: a systematic review of reviews. *BMC Health Services Research*, 14(1), 99-116.
- Turner, E.A., Chandler, M., & Heffer, R.W. (2009). The influence of parenting styles, achievement motivation, and self-efficacy on academic performance in college students. *Journal of college student development*, 50(3), 337-346.
- Twantley, K., Twamley, K., Puthussery, S., Harding, S., Baron, M., & Macfarlane, A. (2011). UK-born ethnic minority women and their experiences of feeding their newborn infant. *Midwifery*, 27, 595–602.

Tyler, C., & Fullerton, G. (2008). The definition and assessment of childhood overweight: A developmental perspective. In E. Jelalian, R. G. Steele, E. Jelalian, R. G. Steele (Eds.). *Handbook of childhood and adolescent obesity* (pp. 63-72). New York, NY: Springer Science.

Tzoulaki, I., Jarvelin, M., Hartikainen, A., Leinonen, M., Pouta, A., Paldanius, M., & Elliott, P. (2008). Size at birth, weight gain over the life course, and low-grade inflammation in young adulthood: Northern Finland 1966 birth cohort study. *European Heart Journal*, 29(8), 1049-1056.

Tzoulaki, I., Sovio, U., Pillas, D., Hartikainen, A.L., Pouta, A., Laitinen, J., & Elliott, P. (2010). Relation of Immediate Postnatal Growth With Obesity and Related Metabolic Risk Factors in Adulthood The Northern Finland Birth Cohort 1966 Study. *American journal of epidemiology*, 171(9), 989-998.

Unger, J.B., Reynolds, K., Shakib, S., Spruijt-Metz, D., Sun, P. & Johnson, C.A. (2004). Acculturation, physical activity, and fast-food consumption among Asian-American and Hispanic adolescents, *Journal of Community Health*, 29(6), 467-81.

United States Census Bureau (2010). 2010 Census Shows America's Diversity, Retrieved from <https://www.census.gov/2010census/news/releases/operations/cb11-cn125.html>

United States Census Bureau (2011). Overview of Race and Hispanic Origin: 2010, 2010 Census Briefs, Retrieved from <https://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>

Uskul, A.K. (2010) Socio-cultural aspects of health and illness. In D. French, A. Kaptein, K. Vedhara, & J. Weinman, (Eds.). *Health psychology* (2nd ed., pp. 347-359), Wiley-Blackwell.

Uzogara, S.G. (2016). Underweight the less discussed type of unhealthy weight and its implications: A review. *American Journal of Food Science and Nutrition Research*, 3, 126-142.

Vainio, H., Kaaks, R., & Bianchini, F. (2002). "Weight control and physical activity in cancer prevention: international evaluation of the evidence", *European Journal of Cancer Prevention*, 11(2), S94-S100.

Vallianatos, H., & Raine, K. (2008). Consuming Food and Constructing Identities among Arabic and South Asian Immigrant Women. *Food, Culture & Society*, 11(3), 355-373.

Van Jaarsveld, C.H., Miles, A. & Wardle, J. (2007). Pathways from deprivation to health differed between individual and neighbourhood-based indices. *J Clin Epidemiol*, 60, 712-719.

van Strien, T., Konttinen, H., Homberg, J.R., Engels, R.C., & Winkens, L.H. (2016). Emotional eating as a mediator between depression and weight gain. *Appetite*, 100, 216-224.

- Varela, R.E., Vernberg, E.M., Sanchez-Sosa, J.J., Riveros, A., Mitchell, M., & Mashunkashey, J. (2004). Parenting style of Mexican, Mexican American, and Caucasian-non-Hispanic families: social context and cultural influences. *Journal of Family Psychology*, 18(4), 651.
- Vélez-Agosto, N.M., Soto-Crespo, J.G., Vizcarrondo-Oppenheimer, M., Vega-Molina, S., & García Coll, C. (2017). Bronfenbrenner's bioecological theory revision: Moving culture from the macro into the micro. *Perspectives on Psychological Science*, 12, 900–910.
- Ventura, A.K., & Birch, L.L. (2008). Does parenting affect children's eating and weight status?. *International Journal of Behavioral Nutrition and Physical Activity*, 5(1), 15.
- Ventura, A.K., Gromis, J.C., & Lohse, B. (2010). Feeding practices and styles used by a diverse sample of low-income parents of preschool-age children. *Journal of nutrition education and behavior*, 42(4), 242-249.
- Vereecken, C., Keukelier, E., & Maes, L. (2004). Influence of mother's educational level on food parenting practices and food habits of young children. *Appetite*, 43, 93–103.
- Vereecken, C., Legiest, E., De Bourdeaudhuij, I., & Maes, L. (2009). Associations between general parenting styles, specific food-related parenting practices, and children's food consumption. *American Journal of Health Promotion*, 23, 233–240.
- Viner, R.M., Fry, T., Gupta, S., Kinra, S., McCarthy, D., Saxena, S., Taylor, S., Wells, J.C.K., Whincup, P., & Zaman, M.J.S. (2010). Insufficient evidence to support separate BMI definitions for obesity in children and adolescents from south Asian ethnic groups in the UK. *International Journal of Obesity*, 34, 656-658.
- Vostanis, P., Graves, A., Meltzer, H., Goodman, R., Jenkins, R., & Brugha, T. (2006). Relationship between parental psychopathology, parenting strategies and child mental health. *Social Psychiatry and Psychiatric Epidemiology*, 41(7), 509-514.
- Wake, M., Nicholson, J.M., Hardy, P., & Smith, K. (2007). Preschooler obesity and parenting styles of mothers and fathers: Australian National population Study. *Pediatrics*, 120, 1520 – 1527.
- Wang, Y., & Beydoun, M.A. (2007). The obesity epidemic in the United States—gender, age, socioeconomic, racial/ethnic, and geographic characteristics: a systematic review and meta-regression analysis. *Epidemiologic reviews*, 29(1), 6-28.
- Wang, F., & Veugelers, P. J. (2008). Self-esteem and cognitive development in the era of the childhood obesity epidemic. *Obesity Reviews*, 9(6), 615-623.
- Wang, Y.C., Mcpherson, K., Marsh, T., Gortmaker, S.L., & Brown, M. (2011). Health and economic burden of the projected obesity trends in the USA and the UK. *The Lancet*, 378(9793), 815-825.

Wang, J., Thornton, J.C., Bari, S., Williamson, B., Gallagher, D., Heymsfield, S.B., & Pierson, R.N. (2003). Comparisons of waist circumferences measured at 4 sites. *The American Journal of Clinical Nutrition*, 77(2), 379-384.

Wanjohi, M., Griffiths, P., Wekesah, F., Muriuki, P., Muhia, N., Musoke, R.N., & Kimani-Murage, E.W. (2017). Sociocultural factors influencing breastfeeding practices in two slums in Nairobi, Kenya. *International Breastfeeding Journal*, 12(5), 1-8.

Wardle, J. (2007). Eating behaviour and obesity. *Obesity reviews*, 8(s1), 73-75

Wardle, J. (2005). Understanding the aetiology of childhood obesity: implications for treatment. *Proceedings of the Nutrition Society*, 64(01), 73-79.

Wardle, J., & Marsland, L. (1990). Adolescent concerns about weight and eating: A social-developmental perspective. *Journal of Psychosomatic Research*, 34, 377-391.

Wardle, J., & Cooke, L. (2008). Genetic and environmental determinants of children's food preferences. *British Journal of Nutrition*, 99(S1), S15-S21.

Wardle, J., Carnell, S., & Cooke, L. (2005). Parental control over feeding and children's fruit and vegetable intake: How are they related? *Journal of the American Dietetic Association*, 105(2), 227-232.

Wardle, J., Carnell, S., Haworth, C.M., & Plomin, R. (2008). Evidence for a strong genetic influence on childhood adiposity despite the force of the obesogenic environment-. *The American journal of clinical nutrition*, 87(2), 398-404.

Wardle, J., Guthrie, C., Sanderson, S., Birch, L., & Plomin, R. (2001). Food and activity preferences in children of lean and obese parents. *International Journal of Obesity*, 25(7), 971-977.

Wardle, J., Sanderson, S., Guthrie, C.A., Rapoport, L., & Plomin, R. (2002). Parental feeding style and the inter-generational transmission of obesity risk. *Obesity Research*, 10, 453-462.

Wardle, J., Carnell, S., Haworth, C.M., Farooqi, I.S., O'Rahilly, S., & Plomin, R. (2008). Obesity associated genetic variation in FTO is associated with diminished satiety. *Journal of Clinical Endocrinology & Metabolism*, 93(9), 3640-3643.

Wardle, J., Cooke, L.J., Gibson, E., Sapochnik, M., Sheiham, A., & Lawson, M. (2003). Increasing children's acceptance of vegetables; a randomized trial of parent-led exposure. *Appetite*, 40(2), 155-162

Warschburger, P., & Kröller, K. (2009). Maternal perception of weight status and health risks associated with obesity in children. *Pediatrics*, 124(1), e60-e68.

Waters, L.E. (2017). Strength Based Parenting: A New Avenue of Practise and Research in Positive Psychology. *Future Directions in Well-Being*, 93-96.

- Webber, L., Cooke, L., Hill, C., & Wardle, J. (2010). Child adiposity and maternal feeding practices: A longitudinal analysis. *The American Journal of Clinical Nutrition*, 92(6), 1423-1428.
- Webber, L., Hill, C., Cooke, L., Carnell, S., & Wardle, J. (2010). Associations between child weight and maternal feeding styles are mediated by maternal perceptions and concerns. *European Journal of Clinical Nutrition*, 64(3), 259–265
- Webber, L., Hill, C., Saxton, J., Van Jaarsveld, C.H.M., & Wardle, J. (2009). Eating behaviour and weight in children. *International journal of obesity*, 33(1), 21.
- Wehrly, S.E., Bonilla, C., Perez, M., & Liew, J. (2014). Controlling parental feeding practices and child body composition in ethnically and economically diverse preschool children. *Appetite*, 73, 163-171.
- Weiss, R., & Caprio, S. (2005). The metabolic consequences of childhood obesity. *Best Practice & Research Clinical Endocrinology & Metabolism*, 19, 405–419.
- Wen, X., & Hui, S.S.C. (2011). Chinese parents' perceptions of their children's weights and their relationship to parenting behaviours. *Child: care, health and development*, 37(3), 343-351.
- West, D.S., Raczynski, J.M., Phillips, M.M., Bursac, Z., Gauss, C.H., & Montgomery, B.E. (2008). Parental Recognition of Overweight in School-age Children. *Obesity*, 16(3), 630-636.
- West, J., Lawlor, D.A., Fairley, L., Bhopal, R., Cameron, N., McKinney, P.A., & Wright, J. (2013). UK-born Pakistani-origin infants are relatively more adipose than white British infants: findings from 8704 mother-offspring pairs in the Born-in-Bradford prospective birth cohort. *Journal of epidemiology and community health*, 67(7), 544-551.
- Whitaker, R.C. (2004). Predicting preschooler obesity at birth: the role of maternal obesity in early pregnancy. *Pediatrics*, 114(1), e29-e36.
- Whitaker, R.C., Deeks, C.M., Baughum, A.E., & Specker, B.L. (2000). The relationship of childhood adiposity to parent body mass index and eating behaviour. *Obesity Research*, 8(3), 234 – 240.
- Whitaker, R.C., Phillips, S.M., Orzol, S.M., & Burdette, H.L. (2007). The association between maltreatment and obesity among preschool children. *Child Abuse & Neglect*, 31(11-12), 1187-1199.
- Whitaker, R.C., Wright, J.A., Pepe, M.S., Seidel, K.D., & Dietz, W.H. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*, 337(13), 869–873.
- Wiest, M., Schüz, B., Webster, N., & Wurm, S. (2011). Subjective well-being and mortality revisited: Differential effects of cognitive and emotional facets of well-being on mortality. *Health Psychology*, 30(6), 728-735.

Wilkinson, S. (2004). Focus group research. In D. Silverman (Ed.), *Qualitative Research. Theory, Method and Practice*. London: Sage.

Williams, D.R., González, H.M., Neighbors, H., Nesse, R., Abelson, J.M., Sweetman, J., & Jackson, J.S. (2007). Prevalence and Distribution of Major Depressive Disorder in African Americans, Caribbean Blacks, and Non-Hispanic Whites. *Archives of General Psychiatry*, 64(3), 305.

Wilson, D.K. (2009). New perspectives on health disparities and obesity interventions in youth. *Journal of Paediatric Psychology*, 34, 231-244.

Wilson, S.L. (2011). A mealtime observation study: Obesity, ethnicity and observed maternal feeding styles. Unpublished doctoral thesis. Leeds. The University of Leeds.

Wing, M.R., Ziegler, J., Langefeld, C.D., Ng, M.C., Haffner, S.M., Norris, J.M., Bowden, D.W. (2009). Analysis of FTO gene variants with measures of obesity and glucose homeostasis in the IRAS Family Study. *Human Genetics*, 125(5-6), 615-626.

Wisniewski, A.B., & Chernausk, S.D. (2009). Gender in childhood obesity: family environment, hormones, and genes. *Gender medicine*, 6, 76-85.

Woods, A.M., Racine, S.E., & Klump, K.L. (2010). Examining the relationship between dietary restraint and binge eating: Differential effects of major and minor stressors. *Eating behaviors*, 11(4), 276-280.

Woodfield, L., Duncan, M., Al-Nakeeb, Y., Nevill, A., & Jenkins, C. (2002). Sex, Ethnic and Socio-Economic Differences in Children's Physical Activity. *Pediatric Exercise Science*, 14(3), 277-285.

World Health Organisation (2017). Obesity and Overweight, Retrieved from <http://www.who.int/mediacentre/factsheets/fs311/en/>

World Health Organisation (2018). Physical activity. Retrieved from <http://www.who.int/mediacentre/factsheets/fs385/en/>

Worobey, J., Borrelli, A., Espinosa, C., Worobey, H. (2013) Feeding practices of mothers from varied income and racial/ethnic groups. *Journal Early Child Development and Care*, 183(11), 1661-1668.

Wulan, S., Westerterp, K., & Plasqui, G. (2010). Ethnic differences in body composition and the associated metabolic profile: A comparative study between Asians and Caucasians. *Maturitas*, 65(4), 315-319.

Wyatt, S.B., Winters, K.P., & Dubbert, P.M. (2006). Overweight and Obesity: Prevalence, Consequences, and Causes of a Growing Public Health Problem. *The American Journal of the Medical Sciences*, 331(4), 166-174.

Yao, N.L., & Hillemeier, M.M. (2012). Weight status in Chinese children: maternal perceptions and child self-assessments. *World Journal of Pediatrics*, 8(2), 129-135.

- Yavuz, H.M., & Selcuk, B. (2018). Predictors of obesity and overweight in preschoolers: The role of parenting styles and feeding practices. *Appetite*, 120, 491-499.
- Yonkers, K., Ramin, S., Rush, A., Navarrete, C., Carmody, T., March, D., et al. (2001). Onset and persistence of postpartum depression in an inner-city maternal health clinic system. *American Journal of Psychiatry*, 158, 1856-1853.
- Yoshinaga, M., Yuasa, Y., Hatano, H., Kono, Y., Nomura, Y., Oku, S., & Miyata, K. (1995). Effect of total adipose weight and systemic hypertension on left ventricular mass in children. *The American Journal of Cardiology*, 76(11), 785-787.
- Young, L.R., & Nestle, M. (2002). The Contribution of Expanding Portion Sizes to the US Obesity Epidemic. *American Journal of Public Health*, 92(2), 246-249.
- Young-Hyman, D., Schlundt, D.G., Herman-Wenderoth, L., & Bozylinski, K. (2003). Obesity, appearance, and psychosocial adaptation in young African-American children. *Journal of Pediatric Psychology*, 28(7), 463-472.
- Yu, Z., Han, S., Chu, J., Xu, Z., Zhu, C., & Guo, X. (2012). Trends in overweight and obesity among children and adolescents in China from 1981 to 2010: a meta-analysis. *PloS one*, 7(12), e51949.
- Zellner, D.A., Loaiza, S., Gonzalez, Z., Pita, J., Morales, J., Pecora, D., & Wolf, A. (2006). Food selection changes under stress. *Physiology & behavior*, 87(4), 789-793.
- Ziegler, P., Briefel, R., Clusen, N., & Devaney, B. (2006). Feeding Infants and Toddlers Study (FITS): Development of the FITS Survey in Comparison to Other Dietary Survey Methods. *Journal of the American Dietetic Association*, 106(1), S12-S27.

Appendix One: Literature Review

1A Critical analysis table of the main studies reviewed

Authors	Research aim	Sample size and characteristics	Data collection methods	Key findings
Anderson et al., 2005.	To identify differences in diets of South Asian and Italian migrants after immigration to the UK	175 women, aged 20 – 42 years, South Asian and Italian	Questionnaire plus 7-day weighed diet inventory	Compared to the general population, first generation migrants have greater changes in dietary differences among immigrant groups. South Asian immigrants are more likely to display atherogenic diets (high in high-energy sugar foods) compared to Italian.
Blissett & Bennett, 2013	To examine ethnic differences in feeding practices and eating behaviours in relation to child weight	171 families, mothers of children aged 2 – 12 years, Black African-Caribbean, White British and White German	Questionnaire plus measurements of child weight	Black African-Caribbean parents are more likely to use high levels of restriction compared to White British and White German parents. Compared to White British and White German children, Black African-Caribbean children displayed the highest levels of food-appropriate eating behaviours. White German parents showed the lowest levels of pressure to eat.
Bush, Williams, Bradby, Anderson & Lean, 1998	To explore how patterns of food intake are influenced by perceptions	119 women aged 20 – 40 years, 63 South Asian	Open-ended questions	Traditional family hospitality is an important part in the food choices and eating behaviours

	of food as hospitality, with a comparison between South Asian and Italian women	born abroad, 56 UK born and 90 Italian, 39 born abroad and 51 UK born		both South Asians and Italian migrants to the UK and second generation born in the UK. First born South Asian maintain the pattern more than British-born Italians.
Chambers et al., 2008	To assess genome-wide association of insulin resistance and related phenotypes among Indian Asians and White Europeans	14,639 men and women, aged 35-75 years from Indian Asian and White European	Questionnaire plus anthropometric measurements and blood sample	Risk allele frequencies of rs12970134 link with BMI are higher among Indian Asian ancestry compared to White European ancestry. Higher risk allele frequencies among Indian Asian in SNP near MC4R suggest genetic association to the increased central adiposity among Indian Asians.
Choudhry & Wallace, 2012).	To explore whether acculturating to the UK has detrimental effects on breastfeeding practices among South Asian women	20 South Asian women	Interviews	Less acculturated South Asian women had little influence on breastfeeding intentions and behaviours. Women who had higher levels of acculturation were more likely to formula feed.
Chowdhury, Ammari, Burden, & Gregory, 2000	To compare birth weights between White and South Asian populations	1852 births in 1975, of whom 517 South Asian and 1852 in 1988, of whom 547 South Asian	Birth records at the Leicester General Hospital Plus mother characteristics	A significant overall increase in mean birth weight was found between White and South Asian from 1975 to 1988. South Asian babies were lighter than White babies.

Chowdhury, Helman & Greenhalgh, 2000	To explore food beliefs and classification system in British Bangladeshi group with diabetes	40 Bangladeshi adults, 20 males and 20 females	Interviews	South Asian Bangladeshi adults reported that food choices are linked to religious and cultural influences. Central themes include strong religious restriction on widely held customs based on availability of food, traditional ways of cooking and consumption of traditional foods.
Condon & McClean, 2016	To explore parents' views on maintaining children's health and well-being following migration to the UK	28 parents; immigrated from (Romania, Poland, Somalia, Pakistan, and Roma)	Focus groups	Apart from Roma parents, all minority groups' perceived barriers to maintaining optimal health and well-being for their preschool children following migration to the UK. Financial difficulties were raised as a barrier for children's exercise amongst Eastern European parents.
Dhawan, 1995	To compare differences in birth weight between first and second generation South Asian women	331 women, 220 first generation and 111 second generation Asians	Retrospective case note study, Bolton District General Hospital Plus mother characteristics	Second generation born babies were heavier than those first generation babies.
Donin et al., 2010	To examine the variations in nutritional composition between ethnic groups	2209 children, aged 9 – 10 years in 85 schools, White European, South Asian, Black African-Caribbean	24 hour recalls of dietary intake survey	South Asian children are more likely to consume higher energy intake of fat, protein and sugar compared to White children. Compared to Caribbean children, Black African children consume a lower fat diet.

Duncan, Birch, Al-Nakeeb, & Nevill, 2012	To assess ambulatory physical activity levels between South Asian and White European children	536 children, 8 – 11 years in five schools, White British and South Asian	Sealed pedometer worn by children for 4 days	Children attained a significant higher level of activity on weekdays than at weekends. White children were more active than South Asian children.
Duncan, Woodfield, Al-Nakeeb, & Nevill, 2008	To compare physical activity levels between White and South Asian children	606 children, 11 – 14 years, White British and South Asian	Questionnaire (Four by one day physical activity recall)	Boys are more likely to be active compared with girls. White children were significantly more active than South Asian children.
Fairley et al., 2015	To describe differences in the prevalence of modifiable risk factors for childhood obesity between White British and Pakistani, and to investigate the associations between these factors and child BMI at 3 years of age	987 mothers, infants follow up visit around 6, 12, 18, 24 and 36 months of age, White British and Pakistani	Questionnaire plus child BMI z-scores at age 3	Compared to Pakistani mothers, White British mothers are more likely to smoke during pregnancy, have higher BMI, breastfeed for a shorter duration and wean earlier, while Pakistani mothers had a higher rate of gestational diabetes and were less active. Positive associations were found between BMI z-score and maternal smoking, maternal obesity, indulgent feeding, lower parental warmth and higher parental hostility.

Falconer et al., 2014	To examine if obesity related behaviours are associated with ethnicity	2273 children, aged 4 – 5 and 10 – 11 years, White British, Black African-Caribbean, South Asian	Questionnaire on perceptions of child weight and health and lifestyle behaviours	Black and South Asian children more likely to be overweight or obese compared to White children. Compared to White children, South Asian and Black children were three times more likely to have an obesogenic lifestyle.
Gardner, Salah, Leavey & Porcellato, 2010;	To explore young Somali women's perceptions and influences on body image and body size	13 Somali women; aged 18-28 years	Focus groups	Somali women felt constrained by Somali culture that favours larger body size, and traditional attitudes towards diet. Environmental barriers hinder these women from being active or eating healthily.
Grace, 2011	To explore the factors that influence lifestyle choices in Bangladeshi community and attitudes towards preventing type 2 diabetes	109 adults, men and women from Bangladeshi origin	Focus groups	Poor knowledge was not the main barrier to healthy lifestyle choices. Rather the desire to comply with complex social and cultural norms, specifically hospitality, drove unhealthy behaviour. Practical and structural barriers hinder healthy lifestyle among Bangladeshi communities include; lack of time and money, difficulties with childcare, poor housing, fear of crime.
Gu, Warkentin, Mais & Carnell, 2017	To investigate whether parental feeding behaviours differ by ethnicity	372 parents of 3 – 5 year olds children, White British, South Asian, Black African and Caribbean	Questionnaire plus demographic and anthropometric information	South Asian and Black African-Caribbean parents displayed greater use of pressure to eat, emotional feeding and instrumental feeding compared to White parents. Black African-Caribbean parents exhibited lower than White parents on monitoring.

Harding, Teyhan, Maynard & Cruickshank, 2008	To explore differences in weight and diet between ethnic groups in the UK	6599 pupils, aged 11–13 years in 51 schools, White British, South Asian, Black African-Caribbean	Questionnaire plus physical measurements of BMI and waist circumference.	Black African and Caribbean are more likely to be overweight compared to White girls. Compared with White girls, Caribbean were more likely to eat breakfast and engage in other dietary practices, whilst Indian girls were less likely.
Hornby-Turner, Hampshire, & Pollard, 2014	To examine differences in physical activity between British Pakistani and White British girls	145 girls, aged 9 – 11 years, and 19 parents, White British and South Asian	Questionnaire plus accelerometer and interviews	British Pakistani girls spent more time sedentary and less likely to engage in exercise and sport compared to White British girls. Fewer British Pakistani girls were likely to actively travel to school and also had higher levels of sedentary behaviours compared to White British girls.
Jayaweera & Quigley, 2010).	To examine the relationship between country of birth, length of residence in the UK, and ethnicity associated with health status, health behaviour and use of health care.	18,818 mothers of infants under one year, White British, South Asian, Black African-Caribbean	Survey plus interviews	Ethnicity appears to be significantly associated with health indicators, independent of country of birth, length of residence and age. Increasing length of residence in the UK among ethnic minority groups (Indian, Pakistani and Caribbean) is associated with better general health and depression. Smoking and consumption of alcohol was associated with ethnicity, more than the length of residence.

Kelly et al., 2009	To examine ethnic differences and the contributing factors to low birthweight	16,157 infants, White, South Asian, Black African and Caribbean groups	Home interviews with mothers	Indian, Pakistani and Bangladeshi infants are lighter – 2.5 times likely to be low birthweight compared to White infants. Discrepancy of birthweight associated with SES factors in ethnic minority groups, for Indian infants, maternal and infant factors were responsible of birthweight differences.
Lawrence et al., 2007	To explore the factors that might affect food choices of women of Black African and South Asian group	33; 20 women aged 24 to 34 years and 13 girls aged 12-16, Black African and South Asian	Focus groups	Black African and South Asian communities took time, price, health and availability into consideration when purchasing food. All groups show similar use of 'Western foods'. Black African women are becoming dissatisfied about their body weight reflected culture change.
Lawton et al., 2008	To explore food and eating practices of Pakistanis and Indians with type 2 diabetes and their perceptions of the barriers towards dietary change	32 adults, 23 Pakistani origin and 9 Indian origin	Interviews	South Asians expressed that fried South Asian foods was 'strength-giving' and highlighted cultural expectation to participate in shared food consumption with family and community members. Despite the risk factors to cardiovascular disease, most of them continued to consume it.

Leon & Moser, 2012	To compare birth weight of South Asian offspring born in the UK to those born in the Indian sub-continent compared to White	861,654 offspring, Bangladeshi, Indian, Pakistani and White British	Cross-sectional analysis, data collected from NHS, key birth details Number for Babies	Babies born in the UK for Indian, Pakistani and Bangladeshi are slightly lighter at birth than those born in the Indian sub-continent. Compared to White offspring, South Asian babies were even lighter for second generation.
Lofink, 2012	To assess the factors which influence children's eating patterns to examine how aspects of locality, history and practices help foster an obesogenic environment	447 children, aged 11 – 14 years, British South Asian, 165 children interviews + questionnaire	Questionnaire plus interviews	An important overlap between cultural and structural pressures encourage this group to consume energy-dense foods frequently around schools and in their communities. This cultural and structural pressures are associated with low-SES neighbourhoods.
McAndrew et al., 2012	To increase the incidence and duration of breastfeeding, especially among those groups who were least likely to breastfeed	30,760 births, mothers from White British, South Asian, Black African-Caribbean and Chinese	Infant feeding survey	Black, South Asian and Chinese mothers in the UK are significantly more likely to initiate breastfeeding and breastfeed for a longer period compared to White British mothers. Although, ethnic minority mothers were found to breastfeed their babies longer than White British, they were more likely to introduce solids early, and while they breastfeed for longer, they were less likely to do so exclusively.

McFadden, Renfrew & Atkin, 2012).	To examine the extent to which cultural factors make a difference to experiences of breast-feeding and also breast-feeding support for Bangladeshi women	23 women of Bangladeshi ethnic group, 28 health practitioners	Focus group Interviews	Cultural factors of Bangladeshi women make a difference to experience of breast-feeding and breast-feeding support. Women's assumptions about colostrum and the barriers to Bangladeshi women that is affecting their decision to give formula to babies in hospital.
Owen et al., 2009a	To measure differences in child physical activity between ethnic groups	1841 children, 9 – 10 years, White European, South Asian, Black African-Caribbean	Children wore Accelerometer (Actigraphy-GT1M activity monitors) for 7days	South Asian children have lower levels of overall activity compared to White European children. African and Caribbean show similar level to White, yet, they show more time in vigorous activity. Girls recorded less activity compared to boys.
Pallan, Parry & Adnab, 2012	To identify cultural contextual influences on childhood obesity in South Asian communities	68 South Asian community stakeholders in the UK (parents, school governors, community leaders, health and local authority representative)	Focus groups	Broad range of factors influence childhood obesity including role of parents and family. Ethnic cultural influences are also involved in traditional cooking practices, social and religious practices, cultural and religious influences on physical activity and perception of lack awareness of healthy lifestyle. Acculturation affected the South Asian diet.

				Different themes identified in child preference, sedentary activities, parental role model, constrained parental time, unhealthy food, access to leisure facilities, fast food availability, food marketing and neighborhood safety.
Pieroni, Houlihan, Ansari, Hussain, & Aslam, 2007	To examine South Asian women's use of traditional culinary vegetables and their link to health perceptions	150 South Asian women, Indian and Pakistani	Questionnaire plus semi- structured interviews.	Traditional culinary foods used by South Asian women were perceived to have a remarkable medicinal value against diabetes. Cultural heritage of food is deeply embedded in South Asian ethnic group.
Rees et al., 2005	To compare ethnic differences in mothers' nutrient intakes to low birth weight infant	165 mothers gave birth to a child with low birth weight infants from White, Asian, Black African-Caribbean	7-days diet diary for mother between 8 – 12 week post-partum	White women had the highest calcium intake in their diet compared to all other ethnic groups. Nearly quarter of the did not achieve the LRNI for calcium. Despite the highest intake of calcium by Asian women and vitamins by Black women, over two-thirds of Asian, Black African and Caribbean women did not meet the RNI for calcium compared to White women.

Rees et al., 2011	To examine the association of the FTO rs9939609 variant with obesity, obesity related traits and type 2 diabetes in South Asians, and use meta-analyses to clarify BMI influences on FTO variants in diabetic South Asians	8091 adults, aged 40 and over Pakistani COBRA study and UKADS/DGP study	BMI measurement plus waist circumference and diabetes	A strong association found between FTO rs9939609 genotype and BMI and waist circumference in South Asians. A-allele was associated with a link to the increase risk of diabetes in South Asians.
Sheikh & Thomas, 1994	To explore the influencing factors to food choice among Asian and White British teenagers	Children aged 12 – 16 years, Asians and White British, 242 food diaries and 156 questionnaires	In-depth interviews plus Open-ended questionnaire Food diaries	A positive relationship was found between food habits and differences in ethnicity. New culture of Western food has evolved to Asian teenagers. Compared to White families, food preparation and consumption is transmitted from one generation to another among Asians.
Smith, Kelly & Nazroo, 2011	To investigate generational differences in lifestyles changing which might explain obesity patterns in ethnic minorities in the UK	9494 adults; Indian, Pakistani, Bangladeshi, Black African, Black Caribbean, and Chinese.	Cross-sectional study; Health Survey for England plus measurements of BMI, health behaviours and SES	Second generation Indian and Chinese groups were more likely to be obese compared to first generation. In all groups the prevalence of obesity increased in the second generation

Traviss, West & House, 2012	To identify factors associated with infants growth up to 6 months, and to explore the effect of ethnicity on the relationship between maternal distress and infant growth	1716 women in pregnancy, 1247 mothers and their babies followed up 6 months, White British and Pakistani	Questionnaire plus anthropometric measure	Pakistani women had more s and depression symptoms fr pregnancy to 6 months postp compared to White women. Depression in pregnancy wa associated with lower infant at 6 months.
Trigwell, Watson, Murphy, Stratton & Cable, 2013	To examine ethnic differences in parental perceptions towards healthy child weight	808 parents of children aged 4 – 16 years; White British, Black African , Somali, Chinese, South Asian, Asian British and Yemeni	Questionnaire	Black Somali parents believe overweight children can still healthy compared to other g Yemeni parents were more l to attribute overweight in childhood to dietary but not physical activity causes. Wh parents believed that both di behaviours and PA play an important role in the develop of childhood obesity.
Twantley et al., 2010;	To explore the factors that impact UK-born ethnic minority women's experiences around infant feeding	34 women and 30 healthcare professionals, White British, South Asian,	Interviews	Mothers reported that the ma barriers to breast feeding we perceived difficulties of bre feeding, a family preference formula feed and embarrass

		Black African-Caribbean		breast feed their babies in from others. South Asian women reported that extended family member were influence their intentions to breastfeed.
Woodfield, Duncan, Al-Nakeeb, Nevill, & Jenkins, 2002	To examine the relationship of sex, ethnicity and SES to physical activity in children	301 children, 11 – 14 years, White British, South Asian, Black African-Caribbean	Questionnaire (Four by one day physical activity recall)	Children with high SES are more likely to be active compared to Low SES. Compared to White children, Black and South Asian children were significantly less active. White boys are more active than White girls.

1B A list of search terms

A number of key search terms including

-Obesity -Ethnicity -Ethnic background
-Childhood obesity -Obesity differences
-Obese children -Obesity in children
-Child weight -Obese child
-Overweight children -Child overweight
-Overweight child -Parenting style
-Feeding style -Eating behaviour
-Parenting practice -Mothers feeding
-Maternal feeding -Mother-child relationship
-Obesity complications -Overweight problems

Multiple search terms were used in combination involving;

*Ethnic minority *Ethnic groups
*Parental feeding *Parental interactions
*Mother-child feeding interaction *Obesity measures
*Genetic *Dietary intake
*Activity level *Factors influences obesity
*Prenatal factors *Postnatal factors
*Mother's weight *Parent weight
*Mother's educational level *Food preferences
*Parent's perceptions *Mental health
*Demographic factors *Acculturation

An additional search terms were applied around theory include ecological systems theory, bronfenbrenner, EST, microsystem, mesosystem, exosystem and macrosystem.

To capture the entire picture around obesity in general, obesity prevalence has been conducted in all of multi-ethnic countries such as the UK, USA, EUROPE, AUSTRALIA.

Terms were entered into search engines using various combinations such as:

(ethnic group* OR ethnicit*) AND (obes* OR obesity*) AND (parent* OR mother*)
AND (feeding* OR parenting*) AND (child weight* OR weight status*)

Appendix Two: Study One

2A Healthcare professional letter

Dear Sir/Madam,

I am a PhD student at Swansea University examining the growing issue of Childhood Obesity.

Recently the National Child Measurement Programme showed that levels of childhood overweight and obesity in the UK differed significantly by ethnic background (for a link to the report please see p.37)

<http://phlive.org.uk/wp-content/uploads/nati-chil-meas-prog-eng-2012-2013-rep.pdf>

Specifically, levels of obesity amongst Black and Asian children were significantly higher than those in White populations, with children from a Chinese background having even lower levels. The aim of my thesis is to explore why these differences might arise.

There has been very little research conducted exploring why these differences occur and my first step is to explore the opinions of experts working in the field of child and public health such as yourself. I would like to invite you to share your experiences and opinions regarding these differences in child health via a short online questionnaire (approximately 5 - 10 minutes). Your opinion is very valuable to us and it will give us broaden horizons about the subject. Your responses will remain confidential and anonymous; you will not be identified from your responses in any research report.

The questionnaire can be found at
(<https://www.surveymonkey.com/r/childmeasurementprogramme>)

If you would like further information or a paper copy of the questionnaire please contact myself on [REDACTED] or my supervisors Dr Amy Brown [REDACTED] or Dr David Rea [REDACTED]

Sincerely yours,

Murhaf Korani
PhD Student
College of Human and Health Sciences
Swansea University

2B A thematic grid – from raw data to codes to subtheme to theme

Theme: Family influences

Example of quotes in theme	Sub themes	Description of sub theme
<p><i>Support and information is also passed between families so beliefs are passed through and they might not often be the healthiest or what we would advise but we are not in charge so can only advise. (Health visitor 1)</i></p> <p><i>Advice and issues are taken from families rather than from professionals. A lot of information and advice is passed between generations and I think this can have both a good and bad effect. (Health visitor 2)</i></p>	Information from family members	<p>Mothers believe that advice from family, particularly older members, is more valuable than from health professionals or other sources.</p> <p>Family members are listened to and trusted above all else.</p>
<p><i>I think these close families also mean that children are less independent and less affected by us as professionals. (Health visitor 2)</i></p> <p><i>It's very hard to convince them it's unhealthy to be overweight- but from my experience, they don't seem to take it seriously. (Practice nurse 3)</i></p>	Ignore advice from health professionals	Health professionals offer advice but feel families do not always listen or follow through with suggestions.
<p><i>I think this then all extends to wider family activities, children don't come and take part in activities or go to clubs, and they are more involved in the families. (Health visitor 2)</i></p> <p><i>The fact that many are from large families and it could be more manageable to keep children occupied by giving them sugary drinks/junk food, which they enjoy and continue to ask for throughout their childhood. (Practice nurse 2)</i></p>	Family size	Family tends to have more children; involved less in sport than activities; keep them calm and busy as a means rather than the manner to manage them.

2C Ethical approval

5th November 2014

Dear Murhaf,

Thank you for the information and the revised application which is now formally approved.

Good luck with your research.

Regards

Steve

(Prof/Yr Athro) S.D.Edwards

Appendix Three: Study Two

3A Parents letter

Child Diet & Activity Survey



Dear Parents,

My name is Murhaf Korani and I am a PhD student in the Department of Public Health, Policy and Social Sciences at Swansea University. For my PhD studies I am exploring parents concerns about what their primary school aged child eats and how much exercise they do.

I would like to ask for your help in completing a questionnaire about your experiences of feeding your child. The questions ask about what problems you might face in doing this and we hope that the findings can be used to help us better support parents in the future.

Taking part is voluntary and you will not be identified from your responses in any way. If you think you would like to take part you can find out more information by following the link below where you will also find the questionnaire. If you decide you want to take part the questionnaire can take around 10 - 15 minutes to complete.

The questionnaire can be found at: www.surveymonkey.com/r/feedingyourchild

All completed surveys will be entered into a prize draw to win £30

If you have any questions or would like a paper copy of the questionnaire please do not hesitate to get in contact with myself or my supervisor Dr Amy Brown at:

Murhaf Korani email: [REDACTED]

Dr Amy Brown email: [REDACTED] Phone: [REDACTED]

Thank you for taking the time to read this letter

Murhaf



3B Parents Questionnaire

Thank you for taking the time to complete this questionnaire. The aim of this study is to explore parents' attitudes towards child diet and exercise and how they fit with wider concerns about parenting. It focuses on children aged 5 - 11 years old.

The questionnaire will ask some general background questions about yourself and your child before focusing on questions related to feeding your child, physical activity and looking after your child. We hope that the responses will help us to better understand the relationship between parenting and child weight. The questionnaire does not require you to give the weight or height of your child.

If there are any questions you do not wish to answer for any reason please just leave them blank. Similarly if you do not wish to carry on completing the questionnaire for any reason please do not continue. Importantly if answering any of the questions raises concerns about yourself or your child in any way, or about other worries that you have, you should contact your health visitor or GP for further advice or support.

There are no right or wrong answers - we are interested in your honest experiences and opinions so please answer as fully as possible. Any information that you do give in the questionnaire will only be used for the purposes of the study, and will be kept confidential. You will not be identified from your answers in any way.

If you have any questions please do not hesitate to get in contact with Murhaf Korani or supervisor Dr Amy Brown in one of the following ways:

Murhaf Korani email: 748425@swansea.ac.uk Dr Amy Brown email: a.e.brown@swansea.ac.uk

Please read through the following statements. If you agree with each statement please select continue with the questionnaire.

- I have at least one child aged 5 - 11 years old
- I have read the participation information sheet and agree to take part in this study.
- I understand that participation is voluntary and I am free to withdraw from this research at anytime.
- I have been informed that all information that I provide will be confidential and anonymous.
- I also understand that I am free to ask questions at anytime during the study.
- I confirm that I am 18 years of age or above and I consent to participate in this study.

About you

How old are you?	
------------------	--

Male	Female
------	--------

Married	Cohabiting	Partner (not living with)
Single	Divorced	Other

If you are separated from your child's other parent, how often do they spend time away from you (e.g. every other weekend)	
--	--

What is your ethnic group?	White British	Gypsy / Traveller	Asian or Asian British: Indian
	Asian or Asian British: Pakistani	Asian or Asian British: Chinese	Asian or Asian British: Other
	Black or Black British	Mixed or multiple	Other

If other what is your ethnic group?	
-------------------------------------	--

What is your highest level of education achieved?	No formal qualifications	GCSE or equivalent	A level or equivalent
	Degree or equivalent	Vocational qualification	Postgraduate or equivalent

Are you currently employed?	Yes	No
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How many hours a week do you work?	
------------------------------------	--

If you are employed what is your occupation?	
--	--

What is your approximate household income (including any income from tax credits etc)	
---	--

In which country were you born?	
---------------------------------	--

If you were not born in the UK how long have you lived in the UK?	
---	--

What language do you usually speak at home?	
---	--

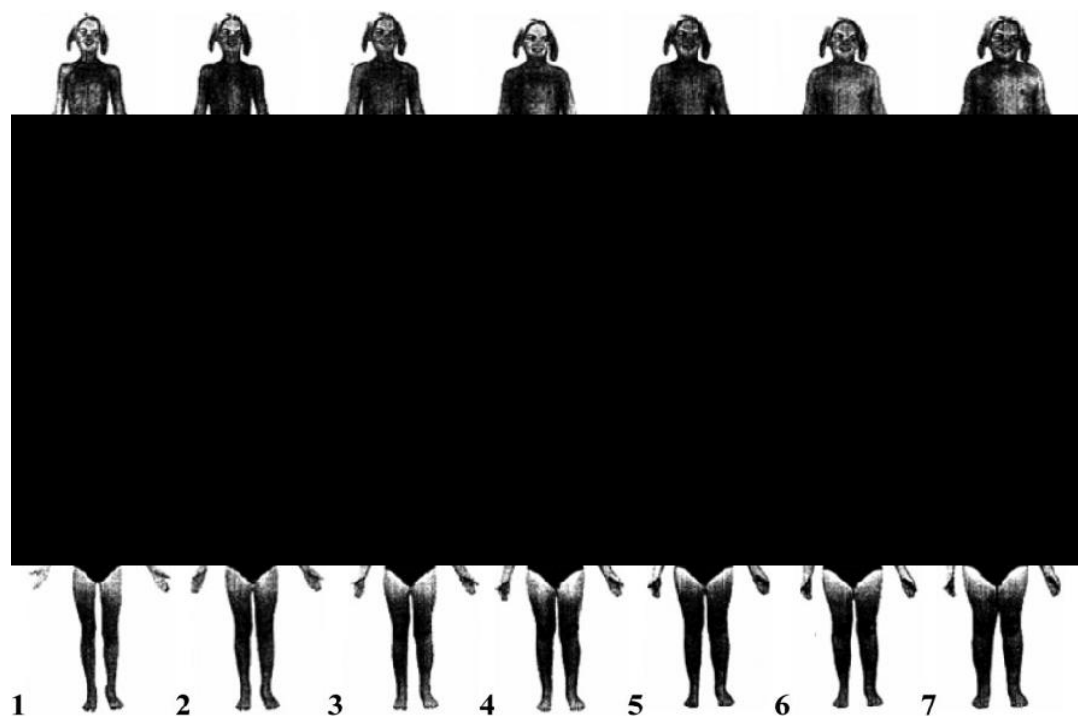
I would describe my religious beliefs as	Very closely	Closely	Quite closely
	Loosely	Not at all	Not relevant

What is the first part (3 or 4 letters) of your postcode?	
---	--

About your child

What is the age and gender of each of your children?	
--	--

Please select one child to fill in this survey for: What is their age and gender?	
---	--



Looking at the body image scale please select the figure that describes:	Your child's current body size	
	Your ideal body size for your child	

Looking to your child how would you describe his/her weight status?

	Markedly Underweight	Underweight	Normal	Overweight	Markedly Overweight
Currently					
During the first year of life					
As a toddler					
As a pre-schooler					

Thinking about your child weight	Unconcerned	A little concerned	Concerned	Fairly concerned	Very concerned
How concerned are you about your child eating too much when you are not around her?					
How concerned are you about your child having to diet to maintain a desirable weight?					
How concerned are you about your child becoming over weight?					

Feeding your child	Never	Seldom	Half of the time	Most of the time	Always
When your child is at home, how often are you responsible for feeding them?					
How often are you responsible for deciding what your child's portion sizes are?					
How often are you responsible for deciding if your child has eaten the right kind of foods?					
How much do you keep track of the sweets (Candy, ice cream cake, pies, pastries) that your child eats?					
How much do you keep track of the snack food (Potato chips, Doritos, cheese puffs) that your child eats?					
How much do you keep track of the snack food (Potato chips, Doritos, cheese puffs) that your child eats?					

Feeding your child	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have to be sure that my child does not eat too many sweets (candy, ice-cream, cake or pastries)					
I have to be sure that my child does not eat too many high-fat foods					
I have to be sure that my child does not eat too much of her favourite foods					
I intentionally keep some foods out of my child's reach					
I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behaviour					
I offer my child her favourite foods in exchange for good behaviour					
If I did not guide or regulate my child's eating, she would eat too many junk foods					
If I did not guide or regulate my child's eating, she would eat too much of her favourite foods					
My child should always eat all of the food on her plate					
I have to be especially careful to make sure my child eats enough					
If my child says "I'm not hungry", I try to get her to eat anyway					
If I did not guide or regulate my child's eating, she would eat much less than she should					

Feeding your child	Never	Rarely	Sometimes	Often	Always
I allow my child to choose which foods to have for meals					
I give my child something to eat to make him/her feel better when s/he is feeling upset					
I encourage my child to look forward to the meal					
I praise my child if s/he eats what I give him/her					
I decide how many snacks my child should have					
I encourage my child to eat a wide variety of foods					
In order to get my child to behave him/herself I promise him /her favourite food					
I present food in an attractive way to my child					
If my child misbehaves I withhold his/her favourite food					
I encourage my child to taste each of the foods I serve at mealtimes					
I allow my child to wander around during a meal					
I encourage my child to try foods that s/he hasn't tasted before					
I give my child something to eat to make him/her feel better when s/he has been hurt					

Feeding your child	Never	Rarely	Sometimes	Often	Always
I let my child decide when s/he would like to have her meal					
I give my child something to eat if s/he is feeling bored					
I allow my child to decide when s/he has had enough snacks to eat					
I decide when it is time for my child to have a snack					
I use puddings as a bribe to get my child to eat his/her main course					
I encourage my child to enjoy his/her food					
I decide the times when my child eats his/her meals					
I give my child something to eat to make him/her feel better when s/he is worried					
I reward my child with something to eat when s/he is well behaved					
I let my child eat between meals whenever s/he wants					
I insist my child eats meals at the table					
I give my child something to eat to make him/her feel better when s/he is feeling angry					
I decide what my child eats between meals					
I praise my child if s/he eats a new food					

The following questions are about you

	Definitely true	Mostly true	Mostly false	Definitely false
I am always hungry enough to eat at any time				
When I smell a delicious food, I find it very difficult to avoid eating even if I have just finished a meal				
I am always hungry so it is hard for me to stop eating before I finish the food on my plate				
When I see a real delicacy, I often get so hungry that I have to eat right away				
Sometimes when I start eating, it seems I am unable to stop				
Being with someone who is eating often makes me hungry enough to eat also				
I get so hungry that my stomach often seems like a bottomless pit				
I consciously hold back at meals in order not to gain weight				
I do not eat some foods because they make me grow fat				
I deliberately take small helpings as means of controlling my weight				
When I feel unwell (depressive, unhappiness), I often overeat				
When I feel lonely, I relieve myself by eating				
When I feel anxious, I find myself eating				

How often do you feel hungry?	Only at meal times	Sometimes between meals	Often between meals	Almost always
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How frequently do you avoid “stocking up” on tempting foods?	Almost never	Seldom	Usually	Almost always
--	---------------------	---------------	----------------	----------------------

How likely are you to consciously eat less than you want?	Unlikely	Slightly likely	Moderately likely	Very likely
---	-----------------	------------------------	--------------------------	--------------------

Do you go on eating binges though you are not hungry?	Never	Rarely	Sometimes	At least once a week
---	--------------	---------------	------------------	-----------------------------

	1	2	3	4	5	6	7	8
On a scale of 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never “giving in”), what number would you give yourself?								

Thinking about caring your child	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I am responsive to our child's feelings and needs					
I use use physical punishment as a way of disciplining our child					
I take our child's desires into account before asking the child to do something					
When our child asks why he/she has to conform, I state because I said so, or I am your parent and I want you to					
I explain to our child how we feel about the child's good and bad behaviour					
I spank when our child is disobedient					
I encourage / they encourage our child to talk about his/her troubles					
I find it difficult to discipline our child					
I encourage our child to freely express himself/herself even when disagreeing with parents					
I punish by taking privileges away from our child with little if any explanations					
I emphasise the reasons for rules					
I give comfort and understanding when our child is upset					
I shout when our child misbehaves					
I praise when our child is good					

Thinking about caring your child	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
I give into our child when the child causes a commotion about something.					
I explode in anger towards our child					
I threaten our child with punishment more often than actually giving it.					
I take into account our child's preferences in making plans for the family					
I grab our child when being disobedient.					
I state punishments to our child and does not actually do them					
I show respect for our child's opinions by encouraging our child to express them					
I allow our child to give input into family rules					
I criticise to make our child improve					
I spoil our child					
I give our child reasons why rules should be obeyed					
I use threats as punishment with little or no justification					
I have warm and intimate times together with our chil					
I punish by putting our child off somewhere alone with little if any explanations					
I help our child to understand the impact of behaviour by encouraging our child to talk about the consequences of his/her own actions					
I criticise when our child's behaviour doesn't meet our expectations					
I explain the consequences of the child's behaviour					
I slap our child when the child misbehaves					

This is the end of the questionnaire. Thank you very much for taking the time to complete it.

Any questions please get in contact via the ways listed at the start of the questionnaire.

Please remember all responses will be treated confidentially.

Some people experience worries or concerns that arise as part of, or alongside, being a parent. It is possible that completing this questionnaire may have drawn your attention to problems you experience as a parent and/or other factors. If you feel that talking to someone might help with these problems we would strongly advise you to contact your GP. If they cannot help you they should be able to put you in contact with someone who can.

3C Ethical approval

8th June 2015

Study reference number 080615

Dear Murhaf

Thank you for providing information on the points raised below. We will not require the names of the questionnaires used – the reassurance that these are frequently used measures will suffice. The support mechanisms identified below are appropriate.

Formal approval for your study is now granted. Please send me updated versions of your forms with the amendments described below.

Best Wishes

Jeanette

Dr. J.L.Hewitt

Associate Professor / Athro Cynorthwyol

Chair, CHHS and College of Medicine Research Ethics Committee

Appendix Four: Study Three

4A Parents study advert

An exciting opportunity to talk about what food and family means to YOU!



- ✓ Are you a mother of a child aged 4 – 11 years old?
- ✓ Do you identify yourself as South Asian or South Asian British?
- ✓ Can you spare an hour to take part in a research discussion group?
- ✓ The discussion will be conducted in English
- ✓ Would you like a £10 shopping voucher for your time?

If you would like more information, please contact:

Murhaf Korani, email:

████████████████████

Phone: ██████████

Dr Amy Brown, email:

████████████████████

Phone: ██████████



4B Participant Information Sheet

Project title: Exploring cultural perception of child-feeding

Investigator: Murhaf Korani

E-mail: [REDACTED]

Supervisor: Dr Amy Brown

Supervisor email: [REDACTED]

My name is Murhaf Korani and I am a PhD student in the Department of Public Health, Policy, and Social Sciences at Swansea University. As part of my research I am conducting interviews with mothers who have school-aged children exploring their experiences of feeding their child. I am interested in understanding what food means to families and how this might affect choices you make. I am particularly interested in how culture affects food choices and for this part of my research am exploring food and culture in South Asian families.

What do I have to do? If you are interested in taking part you will be invited along to a group discussion (a focus group) with other mothers to talk about what food means to you and your family. The focus group will be at a community venue, during school hours so it is easy to get to. The focus group will be around 60 minutes and there will be refreshments. You can get a £10 shopping voucher to thank you for taking part. The focus groups will be run by myself and one of my research supervisors Dr Alexandra Sardani who has lots of experience in running such groups.

What will happen? With your agreement the discussions will be audio recorded. The purpose of audio recording is to ensure accurate capture of the discussions. You will be asked questions about what types of food you prepare and cook in your family, alongside what food means to you and your family. There is no need to answer any question that you don't want to.

What happens to the information? All information which is collected during the research study will be kept strictly confidential. When I write up the research for my PhD thesis I will not attach any names to your answers. I may also publish my

findings in PhD journals but again your answers will remain anonymous. All data will be stored safely in line with the Data Protection Act 1998.

Important information: As a participant in this study, you have the right at any stage of the research to decide if you want to participate or if you do not wish to continue, you remain free to withdraw at any time without penalty. Any data accrued to this point will be destroyed. You will not be identifiable within the data. Nobody else need be aware of your taking part, and the information you provide will not be utilised for any other purpose.

The researcher is entirely neutral and has no conflict of interest to declare.

What do I need to do now? If you are happy to participate, please complete the consent form below. Should you require any further information, please do not hesitate to contact me at the e-mail address at the head of the page.

Kind regards

Murahf Korani

4C Informed Consent Form

THIS IS TO CERTIFY THAT I, _____ (print name) AGREE
TO PARTICIPATE AS A VOLUNTEER IN THE ABOVE NAMED PROJECT.

☐ I understand that the data will be anonymous and information will be kept confidential but if I mention any disclose abusive or neglectful behaviours towards children the researcher have to report it to social services.

☐ I give permission to be interviewed and for these interviews to be audio recorded. I understand that, upon completion of the research, the tapes will be appropriately destroyed. I understand that the research may be published, but that my name will not be associated with the research.

☐ I understand that I am free to decline to answer any question with which I am uncomfortable. I also understand that I am at liberty to withdraw my consent and terminate this agreement at any time, without redress.

☐ I have been given the opportunity to ask questions about the study, and all such questions have been answered to my satisfaction.

Participant

Witness

Researcher

Date

4D Interview Schedule

Demographic Background

Your age:

Level of education:

Number of children in the family:

Where were you born? (UK/Outside the UK)

If you were born outside the UK, how long have you been living here?

Ice-breaker questions

To start I'd like you to tell me a little about your family – your children, where you live and where you consider to be home.

- Tell us about yourself and your family?
- How many children do you have? And how old are they?
- What is their favourite thing to do?
- Were you born in the UK? Were your children born here?
- Where do you consider to be home?

My next questions will explore how you feel about food. What is food like in your house and what does it mean?

- Tell us about a typical days food in your house?
- Who prepares the food?
- How often eat together as a family?
- What are your favourite foods?
- What does food mean to you? Is it just about needing to eat to live or is it more than that?
- What is the meaning of food in your culture?

The next questions will explore your children's favourite foods, how you feel about them eating certain foods and how much they do or do not eat. (each question – can you tell me more about the reasons for that?)

- Tell us what your child does or doesn't like to eat? What is their favourite food?
- How much do your children eat? Do you worry about them eating too much or too little?
- Is there anything you would like them to eat more? Or less of?
- Who chooses how much or what your child eats?
- Do any other members of your family influence what or how much your child eats? Your mother for example or partner or other family members?
- Does your child come and ask for a snack during the day? Do you let them have one?
- Should children eat all the food they are given? Finish all the food on their plate?

What about how food might be used in other ways? (each question – can you tell me more about the reasons for that?)

- If your child has done something good do you reward them with food?
- Do you ever promise your child ‘pudding’ if they eat their main meal?
- If your child is sad or needs distracting, does food help?
- Is food linked to celebration? Or certain times of the year? Or events? (If yes - Is it essential food is part of this – how would you feel if you couldn’t provide that food?)
- How does being able to feed your child make you feel? How would you feel if you couldn’t feed your child how you wanted?
- Is feeding your child just about making sure they’re not hungry or is it more than that?

Thank you. Is there anything else you want to say?

4E A thematic grid – from raw data to codes to subtheme to theme

Theme: Food and family

Example of quotes in theme	Sub themes	Description of sub theme
<p><i>'I'm the one who make the food in the house' (P4).</i></p> <p><i>'In my house I prepare the food but on my husband's day off he does try to do the lunch and the dinner, but mainly I cook in the house yes' (P8).</i></p> <p><i>'When I go to my sisters houses or close family house I will ask them just to make sure there is curry for him specially' (P8).</i></p>	Food as integral to mothering	Ensuring your child eats well is part of being a good, loving mother. Child feeding is part of maternal responsibility. You must be active in ensuring your child eats well
<p><i>'When my husband comes he focuses on encouraging her to eat, for example drinking a glass of milk and make sure she had her egg' (P1).</i></p> <p><i>'I do let him sometimes feed them late in the night and we do have this occasion in my house like 2 o'clock in the morning he would get out and get some food if no body eat in the house' (P8).</i></p> <p><i>'But the boy he is so hard and I think because his dad spoils him that is why I find it hard to stop him he is into his crisps he loves it and chocolate and his into his chocolate wraps chocolate sandwich' (P7).</i></p> <p><i>'They will rummage the cupboard or force their dad to get them something' (P8).</i></p>	Influence of fathers	Fathers as influencing diet; often permissive; often indulgent; different role to mothers
<p><i>'We have this problem; we have very active grandparents in our lives. So my mum will come home to my house and stock up my cupboard with chocolate and biscuits' (P2).</i></p> <p><i>'Sometimes his grandfather would come and knock on the door an he is passing a bar of sweets' (P8).</i></p> <p><i>'My mum loves to force feed him and I cannot say to my mum stop' (P2).</i></p> <p><i>'With the older one (aged 12) if I restrict him from something he will go to his grandmother's house ...I know he is going for the food that I stopped him from having. Mostly I stop him from having too many biscuits and tea' (P8).</i></p> <p><i>'When we go out to relatives and family houses I feel they exposed too much to sugar where deserts, crisps and chocolates and all of those things ... I find it very hard to control them' (P1).</i></p> <p><i>'But with my mum...she does a lot of pressure you know she will try encouraging traditional Bengali foods. Even I probably would not go for, but she says I need to expose them to it so they will like it' (P1).</i></p>	Grandparents influence	Grandparents as indulgent; as influencing intake; seen as submissive; overriding maternal decisions

<p><i>'It's an opportunity to be together to meet friend to enjoy to know each other and to spend time as a family and there is always food in it' (P3).</i></p> <p><i>'Every event has to have food; you cannot have anything without food. Everything definitely every aspect even a meeting has to have food' (P2).</i></p> <p><i>'It's more than just eating you need to gain together so socializing and everything' (P7).</i></p>	<p>Food as bringing family together</p>	<p>Food is part of socialising and togetherness; difficult to avoid food if socialising</p>
<p><i>'I would say being Bangladeshi known for their hospitality with food, food is big social standing. The more you feed your guests the more you seen as personal with good character, kind. It reflects who you are and who your family is' (P1).</i></p> <p><i>'So if you are in relatives' house or any friend house it's rude not to eat if they serving food to you they will give you big portion in each plate ... I mean even if you want to gather or invite someone over your house first thing is come over for food....it's about honouring your guest (P3).</i></p> <p><i>'So if I invited you to my house on a rare occasion, if I did not give you food and it was just tea or coffee it would look so bad and rude. Although you would think it's fine it's just tea and biscuits but in my heart, I would be dying of embarrassment or feeling really guilty' (P5).</i></p>	<p>Food is part of showing love</p>	<p>Food is not just about nutrition but about showing people you love them and care for them; to reject food is to reject love</p>

4F Ethical approval

29th November 2016

Reference Number: 031116

Dear Murhaf,

RE: Application for CHHS & CoM Research Ethics Approval:

Thank YOU for your amendments to your application: Exploring cultural perception of child feeding

Approval is now granted

Best Wishes



Sherrill Snelgrove (Chair Swansea University CHHS & CoM Research Ethics committee)