British and Iranian parents' and children's awareness of the child's weight status, physical activity, sedentary behaviours and fundamental movement skills: A mixed methods approach

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Abstract

Childhood obesity (CO) is an epidemic issue in developed and developing countries (e.g. UK as developed and Iran as developing country) which needs to be addressed. Parents'/children's awareness of weight status and health behaviours of the child are considered an initial step to prevent and mange CO. Thus, the aim of this thesis is to examine and explain parents' and children's awareness of the child's weight status, Physical Activity (PA), Sedentary Behaviour (SB) and Fundamental Movement Skills (FMS) among normal weight and overweight children, in two different countries (i.e. Uk and Iran) with high rate of CO through a mixed method approach. Adopting a sequential explanatory design, this research is conducted in two consecutive phases, including three quantitative studies (using questionnaires) in phase one, following by qualitative study (using interview) in phase two to explain findings of quantitative studies. It should be noted that the studies in this thesis were conducted prior to the covid-19 pandemic.

The sample in the three quantitative studies (studies 1-3) consisted of 217 children (aged 8-10 years); 98 British and 119 Iranian as well as their parents. To assess actual weight status, Body Mass Index (BMI) percentile was measured and children were categorised as normal weight (N=71 British & 74 Iranian, if BMI <85th percentile) and overweight (N=27 British & 45 Iranian, if BMI ≥85th percentile). PA, SB (GeneActive accelerometers) and Fundamental Movement Skills (FMS) (Test of Gross Motor Development–2) of children were objectively measured. Verbal and visual tools were applied to assess weight status perception. Questionnaires were used for assessing PA, SB and FMS perception.

Results of quantitative studies found that many overweight children and their parents in both countries underestimated the child's weight status

verbally and visually, while British parents and children had lower accuracy than Iranian. In both weight groups Iranian parents, their children and British children overestimated the child's PA level while British parents accurately perceived it. Iranian children's overestimation of PA was more than British children. In addition, British parents and their children as well as Iranian normal weight children underestimated the child's SB while Iranian overweight children were aware of their SB. Iranian parents overestimated SB of their children. Concerning FMS, in both countries parents of normal weight children were aware of the FMS levels of children whereas parents of overweight children and all children themselves were not aware of that. Comparing the two countries in study 3, British overweight children had higher levels of overestimation than Iranian overweight children.

The qualitative study (study 4) used semi-structured, face-to-face interviews with 40 parents (20 in each country) who had an 8-10 year old child and were fluent in their respective native languages (English and Farsi). Interviews were recorded, transcribed and analysed thematically.

Results of the qualitative study showed that in both countries parents felt responsible for CO and un/healthy behaviours of children, however Iranian parents, attributed the responsibility also to school and government as well. British parents placed less responsibility on these organisations. 'Denial' was suggested as a parental reaction to CO, and low activity levels and poor FMS of children which may impact parents' awareness. There were a variety of reasons for denial but denial to avoid the social stigma attached to CO was raised mainly among Iranian parents while denial due to normalisation of obesity as well as to deflecting parental responsibility was raised more by British parents. While denial of high SB leading to underestimation was discussed by British parents, overestimation of SB was also discussed by Iranian parents as a strategy to encourage children to be more active, to avoid labelling their child as 'hyperactive' and also to persuade schools and government to promote PA of children. Nonchalant and positive attitudes towards CO and the notion that children will grow out of it was another parental reaction to CO discussed by parents in both countries. These factors were suggested by parents as potential reasons for parents' misperception of their child's weight. Time, cost, convenience, parents' lack of knowledge (on all aspects of obesity, nutrition, PA, SB and FMS) child's preference and weight as well as peer pressure were proposed by parents as barriers to behaviour change.

Overall, the results of the studies in this thesis showed that parents' lack of awareness of CO, PA, SB and FMS of children is a critical issue for managing and treating CO and promoting healthy behaviours of children. In this regard, it was also found parents face various barriers that they need to be supported to overcome them suggesting that increasing awareness alone might not be sufficient. CO prevention and management is a shared responsibility that needs a multi-disciplinary multisector approach. In addition, the results of the studies in this thesis showed that to improve efficacy of intervention programs they need to be tailored to countries/cultures.

Dedication

This work is dedicated to my parents, children and my husband.

My parents; my father, Ali Fazeli, and my mother, Houriyeh Abbaspoor, who believed in me and encouraged me with their best wishes. My father's endless passion and enthusiasm to learn has always motivated me to go forward and follow my dreams. My mother's support, positivity and endless love encouraged me to be stronger and never give up.

My lovely son, Atrin Dalaei, who has been on my side during my journey, putting up with the time I spend on my work, trying to cheer me up and most importantly reminding me to take breaks; especially when he needed me. He has also been amazing in looking after his little sister and caring for her. Atrin, you are wonderful.

My little angel, Adrina Dalaei, who joined us for the last two years of my journey. You made me a stronger person than I could have never imagined.

My beloved husband, Omid Dalaei, who has constantly supported me in every way; financially, emotionally, running the house, supporting Atrin and looking after Adrina etc. Omid, thank you for all your help, you are amazing, this work could not have been completed without you.

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Table of Contents

List of Tables

List of Figures

Abbreviations

BF%	Body Fat Percentage
BMI	Body Mass Index
CDC	Centres for Disease Control
CHD	Coronary Heart Disease
CLASS	Children's Leisure Activities Study Survey
CO	Childhood Obesity
DoH	Department of Health
ECHO	Ending Childhood Obesity
FMS	Fundamental Movement Skills
IOTF	International Obesity Task Force
MET	Metabolic Equivalents
MC	Motor Competence
MVPA	Moderate To Vigorous Physical Activity
NCDs	Non-Communicable Diseases
NCMP	National Child Measurement Program
NHS	National Health System
OECD	Organisation for Economic Cooperation and Development
PA	Physical Activity
PAQ-C	Physical Activity Questionnaire for Children
PE	Physical Education

PSPMSC Pictorial Scale of Perceived Movement Skill Competence for Young Children

SES Socio Economic Status

SB Sedentary Behaviours

SPPC Self-perception Profile for Children

S-RS Screen-Related Sedentary

TGMD Test of Gross Motor Development

TGMD-2 Test of Gross Motor Development second edition

TGMD-3 Test of Gross Motor Development third edition

TTM Transtheoretical Model

TRS Teacher Rating Scale

UK90 British 1990 Growth Reference

WHO World Health Organisation

Chapter One

1.1 Introduction

Childhood obesity (CO) is a global epidemic according to the World Health Organization (WHO, 2021a). This chapter will provide a background to CO with respect to the definition, prevalence, health consequences and contributing factors. It will also include a discussion on the importance of parents' and children's awareness of a child's weight status as well as healthy behaviours for addressing CO worldwide. The role of culture on CO and related behaviours will also be discussed.

1.2 Background to the obesity problem

1.2.1 Obesity

Obesity and overweight are defined as the excessive accumulation of fat, due to an imbalance between consumed as well as expended calories, which endangers the health (WHO, 2020a). When energy intake is greater than the expenditure, the extra energy will be stored as excessive fat in the body (WHO, 2020a).

1.2.2 Prevalence of obesity worldwide

According to the World Health Organization (WHO, 2014; 2018), obesity and being overweight is the 5th cause of mortality in the world, causing at least 2.8 million deaths annually (WHO, 2021b). Obesity is a major public health problem in developed and developing countries. Worldwide obesity rates have grown such that it has nearly tripled since 1975 (WHO, 2020b). According to the WHO (2016) more than 1.9 billion adults (aged 18 or over) were overweight in 2016, of those 650 million were identified to be obese (WHO, 2016; 2020a). Obesity affects countries with varying incomes: high-income, low-income and medium-income (WHO, 2021a), and almost all age, gender, ethnic, and socioeconomic groups differently (Rahmani et al., 2015; Stice et al., 2006). In this regards, dependent on these factors, various obesity rates are reported in countries across the world (some of these factors are discussed below).

1.2.3 Prevalence of Childhood Obesity worldwide

Childhood obesity (CO) is one of the most serious global public health problems in the 21st century, according to the World Health Organization (WHO, 2016; 2018). Over the past few decades prevalence of CO for all ages has increased rapidly across the world (Di Cesare et al., 2019). However among children and adolescents aged 5-19 obesity has increased more dramatically compared to younger children. The prevalence of obesity in this age group (5-19) has increased by more than four-fold between 1975 and 2016, with a rise from just 4% in 1975 to over 18% in 2016 (WHO, 2018; 2021a). Worldwide over 340 million children and adolescents aged between 5 to 19 years, were reported to either be overweight or obese, in 2016.

The prevalence of obesity varies based on various racial, culture, ethnic, and socio-economic factors (Morales Camacho et al. 2019). Studies show heterogeneity in prevalence of CO between regions and countries across the world, according to the stage of the global obesity issue they are encountering (Di Cesare et al., 2019; Jaacks et al., 2019). In 2013, more than 22% of girls and nearly 24% of boys living in developed countries were found to be overweight or obese. Rates are also high in the developing world; where nearly 13% of boys and more than 13% of girls are overweight or obese (da Fonseca et. al., 2017; WHO, 2016). Once CO was a problem in high income/developed countries, however the epidemic is significantly growing in low- and middle-income/ developing countries particularly in urban settings. A faster growing in these countries is reported in regions such as Northern and Southern Africa, the Middle East and the Pacific Islands (WHO, 2018; 2021a).

Considering the high rate and wide variations of CO among countries, the focus of this thesis is therefore on two diverse countries, UK (as a high income/developed country) and Iran (as a middle income/developing country), both facing the issue of CO (although the rate of CO differs in both the countries). The prevalence of CO and particular issues around it in the UK and Iran will be discussed in chapter two.

1.2.4 Health consequences of CO

In children, obesity has an adverse effect on their health condition that results in a number of both short- and long-term consequences (Chapman et al., 2020; Di Cesare et al., 2019; 2020a). In the short term, obese children suffer from various physical and psychological problems. They are more likely to develop early onset of metabolic and cardiovascular problems (e.g. type 2 diabetes, hypertension, chronic inflammation, dyslipidaemia, etc.) at early ages (Di Cesare et al., 2019; Ebbeling, Pawlak & Ludwig, 2002; Sahoo et al, 2015). Frequent liver (hepatic) and renal (kidney) related complications, musculoskeletal problems, as well as neurological complications, have been also reported (Di Cesare et al., 2019; Ebbeling, et al., 2002; Pandita, et al., 2016). Asthma, exercise intolerance as well as sleep apnoea (sleep disordered breathing) are examples of Pulmonary/ respiratory complications associated with CO. In addition, the physical activity of an obese child can be limited due to development of asthma or exercise intolerance. This is while PA participation is critical for losing weight and treatment of the physical health consequence of obesity (Bryant et al., 2014; Gumbiner, 2001).

In addition to physical complications, overweight children may also experience psychological and psychosocial symptoms in relation to their obesity (Ebbeling, et al., 2002; Mareno, 2014). Findings of many studies indicate that the psychosocial distress that children with obesity or overweight face, in addition to their quality of life and wellbeing, significantly affects their mental health (De Giuseppe et al., 2019; Ebbeling et al., 2002; Pandita et al., 2016; Sahoo et al., 2015). For instance, obese children are stereotyped as unhealthy, being lazy, not being physically active, unsociable, academically unsuccessful, unhygienic, and also are more likely to be bullied in school (Braley, 2016; Ebbeling et al., 2002; Foster & Hale, 2015; Howe et al., 2017). This can result in various psychological comorbidities such as depression, anxiety, low self-esteem, a series of emotional and behavioural disorders (e.g. eating disorder, body image dissatisfaction etc.) in children and adolescents (Di Cesare et al., 2019; De Giuseppe et al., 2019; Ebbeling, et al., 2002; Pandita, et al., 2016).

Furthermore, the health risks related to obesity may differ by ethnic and cultural differences (Ebbeling et al., 2002; Caprio et al., 2008). For instance, studies show that compared to their White European peers, South Asian children (<16 years) are almost 14 times at greater risk of developing symptoms of metabolic disease such as type 2 diabetes mellitus and cardiovascular disease (Shah, Radia, McCarthy, 2020;

Whincup et al., 2010). Asian people, more susceptibility to these metabolic diseases, are reported to have genetically greater body fat, than White people measured by BMI (Caleyachetty et al., 2021; Hudda et al., 2017; Shah et al., 2020). On the other hand, psychological distress is reported to be more severe for White children (particularly girls) and they are more likely to experience more common mental health issues compared to other ethnic groups (Ebbeling et al., 2002; Goodman, Patel, & Leon, 2008; Kimm et al., 1997)

Regarding long term effects, CO is closely linked to adult obesity such that it is more likely that obese children will turn into obese adolescents and then into obese adults (Hussin, Mohammad, Al-Hamad, Makboul, & Elshazly, 2011; WHO, 2016; 2020a). About 80% of obese children are reported to remain obese in their higher ages (Baygi et al., 2012). Thus in long term CO is associated with the onset of various health risks (heart disease, diabetes, hypertension, musculoskeletal disorders and cancer in adulthood) which increase the risk of disability and premature mortality in adulthood (Di Cesare et al; 2019; Dietz, 1998; Perrin et al., 2010; WHO, 2020a). It is estimated that overweight or obesity leads to at least 2.6 million deaths a year (WHO, 2020a). Studies show that treatment of obesity in adults is difficult and yet available obesity management programs are unsuccessful, hence highlighting the importance of early obesity prevention (Di Cesare et al., 2019; Pandita et al., 2016). Therefore, considering the track of CO into adulthood and low efficacy of obesity treatment programs in adults, prevention and treatment of CO is critical (Di Cesare et al., 2019; Pandita et al., 2016).

1.2.5 Contributors to CO

Obesity is a complex condition with multifactorial contributors (Butland et al, 2007; WHO, 2020a). In fact, obesity is result of interaction between various factors and determinants that are related to one's biology, eating practices and physical activity within social, cultural and environmental settings. The UK Foresight report of 2007, described obesity as a "complex web of societal and biological factors that have, in recent decades, exposed our inherent vulnerability to weight gain." (Butland et al, 2007; Morris et al, 2018). This report presented an obesity system map (see figure 1) with energy balance at its centre, surrounded by various variables (determinants) that directly and indirectly influence this energy balance. There are 108 variables interacting with each other and hence this results in the existence of approximately 300 causal links (illustrated by solid or dot lines) acting at the individual, family, societal and group levels. All the variables are categorised into one of the seven domains (themes) including;

1) Physiology (e.g. genetic, predisposition to obesity, etc.),

2) Individual activity (e.g. level of recreational activity, parental modelling of activity, learned activity patterns, etc.),

3) Physical activity environment (e.g. facilitators or barriers to PA such as cost and cultural values, etc.),

4) Food consumption (e.g. Energy density of food, portion size, etc.),

5) Food production (e.g. Market price of food, cost of ingredients, etc.),

6) Individual psychology (e.g. Level of parental control, self-esteem, etc.),

7) Social psychology' (e.g. education, TV watching; societal attitudes to weight such as acceptance of obesity, etc.) (Butland et al, 2007).

Although this map has introduced numerous variables as contributors to obesity, four variables are recognised as the key determinants (Butland et al, 2007). These are ‘level of primary appetite control’, ‘force of dietary habits’, ‘level of physical activity’ and ‘level of psychological ambivalence’ each from one of the four main domains illustrated in the obesity system map (i.e. physiology, food, activity and psychology domains).

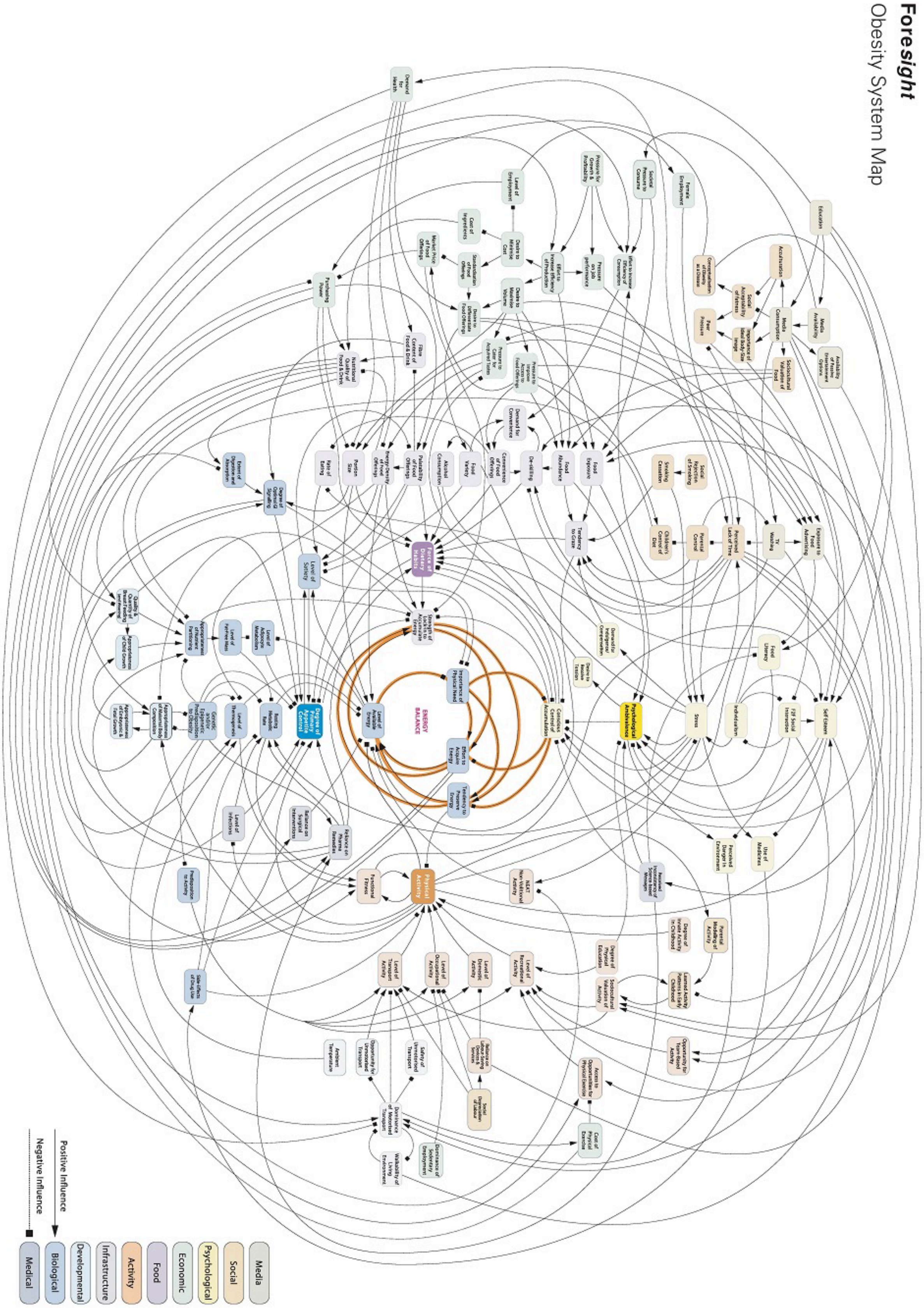
In regard with CO, studies show that among various factors, behavioural factors including PA, SB, and nutrition are the main contributors to the dramatic rise in CO (Braley, 2016; Davison & Birch, 2001; Jabalas et al., 2011; WHO, 2020a). For instance, it is shown that while genetics are an important factor in development of obesity in children, they contribute only to nearly 5% of obesity in children (Sahoo et al., 2015). Taking into consideration that children’s diet, PA, and SB patterns and their attitudes towards healthy behaviours develop within the family, and unlike adults, children can’t choose the environment they live in and the food they eat, family has a great role in development/prevention of CO (Davison & Birch, 2001; Golan & Crow, 2004; Hardy et al., 2007; Jones et al., 2007; Mellor, 2010; Rich et al., 2005; WHO, 2020a). In this regards, various socio-cultural and familial factors and characteristics are reported as main determinants of CO that are influenced by the culture/ethnicity of family. These factors are, Genetic susceptibility towards obesity; Family perceptions and knowledge regarding obesity, Health behaviours and nutrition; Family’s home environment; Parenting style; Parents’ practices (actions) and Family lifestyle (including diet, PS, and SB patterns).

WHO has considered that the changes in activity (low PA and high SB) and nutritional patterns are mainly due to the change in society (WHO, 2020a). In this regards, social, economic and environmental changes as well as limited policies to address obesity in various sectors including; agriculture, transport, urban planning, food production, distribution and marketing, as well as education (WHO, 2020a). Thus, a culturally related multisector and multidisciplinary approach is proposed to be critical for prevention and treatment. For instance, it is reported that prevalence of obesity and SB is much higher in developed countries compared to developing countries ; though PA levels are higher in developed countries (Hovsepian et al., 2016; Kelishadi, et al, 2007; 2016; Smith, Fazeli, Wilkinson, & Clark, 2021; WHO, 2020a). A comparison of various societal factors that might influence weight gain and health behaviours of children, between UK and Iran, will be discussed in detail in chapter two.

Regarding activity levels of children, studies across the world show that children are becoming more sedentary compared to previous generations and their PA level is very low (Aubert et al., 2018; Cesare et al., 2019; Robinson, 2011). A fundamental cause of obesity is the imbalance between energy intake and energy expenditure (Wilks, Besson, Lindroos & Ekelund, 2011). These low PA and high SB levels in children are reported to greatly contribute to CO through an increase in energy intake (Love, Adams, Van Sluijs, 2019; Must & Parisi, 2009; Wilks et al., 2011). This is why higher levels of energy expenditure (through more PA and less SB) are essential for maintaining a healthy weight. Recently, several researchers have introduced children's Fundamental Movement Skills (FMS) as an important factor for increasing children's PA and influencing the weight status of children (Clif et al., 2012; De Meester et al., 2016a; Jones et al., 2010; Okley et al, 2004; Rodrigues et al., 2016; Stodden et al., 2008). It is indicated that low level of FMS (physical competency) result in a low PA as well as contribute towards the risk of weight gain and obesity. However studies show that FMS level of children is low and there is a need to improve children's FMS (Bryant et al., 2014; Duncan, Bryant, & Stodden, 2016; Khodaverdi & Bahram, 2015; Khodaverdi et al., 2016; Siahkouhian et al., 2011).

Therefore, considering that; worldwide, children have low level of PA and high SB which are two key contributors to the rise of CO, as well as important role of FMS on CO, along with the critical role of family on children's weight and health behaviours which are also influenced by culture/ethnicity, the following sub-sections will discuss how PA, SB, and FMS can contribute to CO. Moreover, the way that parents and culture contribute to the child's weight through these behaviours will be discussed.

Figure 1: Foresight Obesity System Map



1.3 Sedentary behaviour (SB) and obesity

SB is not simply failure to meet the PA recommendations and should be distinguished from PA (LeBlanc et al., 2015; Tremblay, Colley, Saunders, Healy, & Owen, 2010). SB is characterized as an activity/waking behaviour with very low energy consumption (i.e. ≤1.5 Metabolic Equivalents), mainly involving lying down or sitting (Scholes, 2016; Tremblay et al., 2017). Generally SBs are grouped into Screen-Related Sedentary (S-RS) behaviours (e.g. watching TV, playing computer games etc.) and non-screen related (e.g. motorised transport, reading, talking etc.) behaviours (Beddhu et al., 2015). Accumulation of SBs, regardless of PA levels, are shown to be independent risk factor for health (Bankoski et al., 2011; Knowles, Kirk & Hughes, 2015; Maher et al., 2013; Owen et al., 2010). In children, it is reported that spending excessive time being sedentary will cause serious physical, behavioural and psychological health risks, including increased adiposity and obesity (Carson et al., 2016; Scholes, 2016; WHO, 2020c). SB among children is an important factor causing obesity, as it creates an energy imbalance between consumed and expended calories which leads to metabolic dysfunctions (Grewal, 2013; He, Piché, Beynon,& Harris, 2010; Luban et al., 2011; WHO, 2014).

Regarding the prevalence of SB, there are not any global estimates of SB of adult and children thus various percentages have been reported across the world (Hoffmann et al., 2019; WHO, 2020c). This is related to studies/surveys' methodological differences (self/parent report vs device based measurement) and their limitations (e.g. available devices don't distinguish between sitting, lying or standing still positions) as well as the timespan (e.g. after-school vs the whole day period). Which make the comparison of the studies difficult/impossible and result in various estimations. Having said that, what is known is that, due to following a sedentary lifestyle there has been an increase in sedentariness Worldwide (Khan, Uddin, Lee & Tremblay, 2019; WHO, 2020c). Concerning children's SB, studies across the world show that children have become more sedentary so that high level of SB in children is a global concern (Aubert et al., 2018; Carson et al., 2016; Di Cesare et al., 2019; Robinson, 2011; WHO, 2020c). This is while the worldwide pandemic of Covid-19 is shown that has increased SB of children in the past year since March 2020 (Stockwell, et al., 2021).

In recent years, children's activity patterns have shifted from outdoor play to indoor entertainment, as a result of lifestyle change (Gupta et al., 2007; He et al., 2010; Maitland et al., 2013; Popkin, 2001). Indoor entertainment including S-RS behaviours (TV watching, spending time on the internet and video games) has decreased children's participation in PA. Although sometimes S-RS behaviours can be performed while being active, these behaviours are reported as the most prevalent SBs of children, which contribute to an inactive lifestyle and endanger children's health (Aubert et al., 2018; Grewal, 2013; Hoffmann et al., 2019; Loprinzi & Cardinal, 2011; Pearson, 2011; Scholes, 2016; WHO,2020c). Thus, considering their importance, S-RS behaviours have been often considered as a proxy for SB and hence are the main focus of research examining these behaviours in children. Various adverse health outcomes have been reported to be associated with S-RS behaviours (Aubert et al., 2018; Carson et al., 2016; He et al., 2010; Hoffmann et al., 2019; Scholes, 2016; Tremblay et al., 2011;WHO, 2020c). For instance, it is shown that extensive S-RS behaviours (e.g. more than 2 hours TV watching daily) are consistently, associated with overweight in children due to reducing energy expenditure. In addition, it is reported that S-RS behaviours can lead to more energy intake due to encouraging overeating and increasing consumption of unhealthy food among children which is an important contributor to obesity (He et al., 2010; Jaballas et al., 2011; Maitland et al., 2013). Therefore, limiting the S-RS behaviours is considered as a critical factor to prevent and treatment of CO (He et al., 2010; AAOP, 2011).

In this regard, while available SBs' guidelines, have recommended that children's total SBs should be limited, reducing S-RS behaviours is a main focus of all these guidelines. For instance, WHO has recommended that children and adolescents limit the time that they are spending being sedentary, especially in relation to S-RS behaviours however no specific time is provided for S-RS behaviours (WHO, 2020c). Similarly, The UK Chief Medical Officers' (CMO) guidelines don't recommend specific daily time for screen time of children and just advice children of all ages to minimise their extended sedentary time, particularly emphasises on reducing TV watching or computer/video games times (Bently et al., 2016; DHSC, 2019; Scholes, 2016). Many countries such as Australia, USA, and Canada however, have recommended that watching TV/screen should be limited to no more than 2 hours per day, in children and youngsters (AAOP, 2011; AGDH, 2014; Aubert et al., 2018; Carson et al., 2016). This is indicated, by American Academy of Paediatrics, as one of the main factors that reduce the risks of obesity in children (AAOP, 2011). In addition, regarding other SBs, UK CMO guidelines advice children and youth to break up their sedentary times; for instance, while using motorized transportations (i.e. bus or car) for long distances, making part of the journey by walking (DOSC, 2019). Australian guideline, similarly, recommends youngsters to shorten their extended times of sitting as well as encourage them to positive social interactions, while using screen related media (AGDH, 2014).

1.4 Physical activity (PA) and obesity

PA is defined as 'any bodily movement produced by skeletal muscle that results in energy expenditure' (Caspersen, Powell, & Christenson, 1985; Sirard & Pate, 2001). It is well documented that regular physical activity reduces the incidence of many chronic conditions such as obesity, Coronary Heart Disease (CHD), diabetes, and colon cancer (Sirard & Pate, 2001; Team, 2015;Warburton, & Bredin, 2017; WHO, 2020c). Since the onset of many chronic diseases such as obesity, the risk factors for CHD, and diabetes can begin from early childhood, it is critical that primary prevention programs that involve physical activity begin early in life (Sirard & Pate, 2001; Williams, Carter, & Wynder, 1981).

Growing evidence shows that participation in PA is an important factor in tackling and preventing CO (Bosch, Stradmeijer, & Seidell, 2004; Hume et al., 2008). However, research report that worldwide PA of children and adolescents is low, which is concerning and needs urgent action (Aubert et al., 2018; WHO, 2019). A global PA guideline for children and adolescents, recommended by the WHO, is that children and adolescents aged 5-17 years should participate in Moderate to Vigorous Physical Activity (MVPA), for at least for 60 minutes every day (WHO, 2011; 2020b). A recent study by WHO in 2016, shows that of the 1.6 million data reported by children aged 11-17 years from 146 countries , 81% of them are not meeting the recommended level of daily 60 minutes MVPA. Another study on 49 countries across the world also shows that in 2017-2018 children and youth aged 5-17 are not having sufficient daily PA. As a result of the worldwide pandemic of Covid-19 it is likely that more children are not meeting the recommended level. A systematic review by

Stockwell et al. (2021) has reported a decrease on PA of children during Covid-19 pandemic.

According to Welk's Youth Physical Activity Promotion (YPAP) model correlates and factors affecting youth physical activity are divided into three groups: Predisposing, reinforcing and enabling factors. Predisposing factors include psychological determinants and are represented by the two components (Welk, 1999; Welk & Eklund, 2005). These components are "is it worth it?" (Include 1) cognitive variables; such as attitudes, perceived benefits and beliefs about physical activity and 2) affective variables; such as enjoyment and interest in physical activity) and "am I able?" (Include self-worth, self-efficacy and perceived competence). Reinforcing factors consists of social factors that influence children PA such as family, peer and coach influence. Enabling factors include environmental (such as equipment, parks and programs) and biological factors (such as physical skills, fitness and BMI). In his model Welk has introduced self-efficacy, perceived competence, enjoyment, parental influence and access to the environment as the most common determinants of physical activity. As mentioned earlier, in Welk's model, family influence is considered as reinforcement factors that directly influence children physical activity behaviour. However, it is proposed that parental influence as a socializations agent can indirectly affect PA behaviour of children through predisposing factor. This highlights the significant role of family in children's participation in physical activity (Welk, 1999; Welk & Eklund, 2005; Mitchell, Inchley, Fleming & Currie, 2015) which will be discussed later in this chapter.

1.5 Fundamental Movement Skills (FMS) / actual physical competence

In recent years, FMS is identified as an important factor for preventing and fighting obesity in children (Clark et al., 2018; De Meester et al., 2016a). FMS are the basic learnt skills that don't develop naturally and are considered as building blocks for advanced/complex movements and skills in specific sports among children (Barnett et al., 2016; Gallahue, Ozmun, & Goodway, 2012). FMS consists of three groups of skills: Stability (e.g. static or dynamic balance), Locomotors skills (jump, run, hop, leap, slide, and gallop) and Object-control skills (throw, catch, kick, dribble, roll and strike). Children will engage in physical activities through execution of FMS (Robinson, 2011). Therefore, it is a critical factor for participating in physical activities (Cliff et al., 2012; Robinson, 2011). Studies show that children and adolescents' participation in PA is attributed to their FMS ability (Barnett, Hinkley, Okely, & Salmon, 2013). In order to participate in different forms of sports and activities it is essential that children achieve the basic competence in these skills (Barnett et al., 2009; 2011). In addition, it is recommended that by age of eight, all children should have mastered all basic FMS (Gallahue & Ozmun, 2006). Children FMS competence/proficiency (movement competence) refers to the mastery over these fundamental skills and is shown to be positively associated with increased PA engagement (Iivonen et al., 2013; Kalaja, Jaakkola, Liukkonen, & Watt, 2010; Liong, Ridgers & Barnett, 2015; Lubans, Morgan, Cliff, Barnett, & Okely, 2010). Several studies also reported FMS proficiency in childhood is a predictor of PA in adolescence (Barnett et al., 2009; Barnett et al., 2011; Bryant, Duncan, & Birch, 2014).

Considering the importance of FMS, the first comprehensive conceptual model developed by Stodden et al. (2008), proposed that the underlying mechanism of PA is motor skill competence (FMS). This model proposes that there is a reciprocal relationship between motor competence (MC) development, PA involvement and weight management. Increased level of PA will improve and increase children motor skill competence, thus, over developmental time, the relationship between PA and FMS proficiency will strengthen which will influence children's weight status. According to this model, although motor competence (MC) is considered as fundamental factor for PA participation, it can be mediated by other factors such as; age, perceived competence, health related fitness (HRF) and the risk of obesity (Stodden et al., 2008). For instance, it is proposed that children with a higher HRF, participate in longer and more intensive PA compared to children with a lower HRF. Thus, as a result their MC will develop and they enter the positive spiral of engagement resulting in promoting healthy weight status (Stodden et al., 2008; Tammelin et al., 2003). On the other hand, children who have a decreased HRF will not be able to participate in PA for as long therefore, do not have the opportunity to develop their MC due to the reduced time in PA and as a result display the negative spiral of disengagement leading to increased weight and obesity. The same process applies to perceived competence which will be explained later in the related section in this chapter.

The relationship between children's FMS, PA, and obesity is also well documented (Clif et al., 2012; De Meester et al., 2016a; De Rodrigues et al., 2016; Jones et al., 2010; Okely et al, 2004). It is shown that overweight and obese children's FMS levels are lower than healthy weighted children, which causes a lower level of PA among the obese children (Barnett et al., 2009). Due to their body mass, overweight children have difficulty performing loco-motor skills (e.g. run, hop) as they require greater overall movement of body mass compared with object-control skills (Okely, Booth & Patterson, 2001; Jones et al., 2010). Therefore, identification of poorly developed FMS/motor competency in children is essential in targeted intervention programs. These need to be considered as a matter of urgency due to the impact that Covid-19 lockdown has had on reducing children's involvement in developmental exercises (e.g. playing and interacting with peers outside) (Eddy et al., 2020).

1.6 Role of parents and obesity

There are a number of behavioural factors contributing to CO that can be mediated and buffered by the impact of family norms on children's behaviour (Rhee, 2008). Family members, especially parents, play an important role in the development and improvement of health behaviours of children (Corder et al., 2010; Lundahl et al., 2014; Taylor, Baranowski, & Sallis, 1994). Parental influence on children' behaviours includes parenting practices, modelling, attitudes, and setting a home environment that fosters specific behaviours, beliefs, and social norms (Braley, 2016; Remmers, 2014; Rhee, 2008). Therefore, parents are generally considered as the agents of change in the prevention and treatment of childhood overweight (Golan & Crow, 2004; Slater, Bowen, Corsini, Golley, & Noakes, 2009). It is shown that among the programs that aim to prevent and treat CO, those that involve parents are amongst the most successful and most long lasting (Epstein, Myers, Raynor, &Saelens, 1998; Golan & Crow 2004; Towns & D'Auria, 2009). In this regard studies targeting behavioural change have reported better weight reduction in long term for groups that had parents' involvement. For instance, Epstein et al. (1981) in their 10-years follow-up study found that the group with parents participation had a considerable weight reduction compared to no parent groups. Golan & Crow (2004) in their 7-years follow-up study also reported more weight reduction for the parents only group compared to children only group (29% vs 20.2%). Conversely, parents can undermine the success of CO treatment programs, by creating an unhealthy home environment through their unhealthy strategies and practices towards children diet and activity patterns (e.g. not restricting unhealthy eating and screen time), poor role modelling and inappropriate health beliefs (Golan et al., 2006; Hardy et al., 2004; Hart et al 2004; Howard, 2007; Polfus et al., 2012).

Parents have a great influence on children's weight related behaviour, particularly PA, SB and diet, thus children's dietary and activity patterns and preferences form within the family context (Braley, 2016; Davison &Birch, 2001; Remmers, 2014; Rhee, 2008). They can, directly control and manage the home environment (Braley, 2016; Remmers et al., 2014; Rhee 2008). Parents can develop and improve children's diet and activity behaviours by establishing optimum eating habits and activity patterns (Corder et al., 2010; Lundahl et al., 2014). For instance, by promoting and increasing the children's participation in PA, parents play a major role in improving their children's active lifestyle (Grewal, 2013; Maitland, Stratton, Foster, Braham, & Rosenberg 2013; Welk, 1999). Further, they can influence and increase their children's PA through a variety of mechanisms such as modelling (parent's patterns of physical activity), social influence (encouragement), and social support (providing transportation) (Taylor et al., 1994; Welk, Wood, and Morss, 2003). This parental influence as stated earlier in previous section, is categorised into direct and indirect influence, by Welk et al. (2003). Directly may be through facilitating their transportation; while, indirect influence happens through encouraging to participate in physical activities and is widely accepted as a powerful form of parental influence on children's PA participation (Anderssen & Wold, 1992; King, Tergerson, and Wilson, 2008; Welk et al., 2003). Furthermore, parental support and restrictions on children's SB at home are crucial for reducing this unhealthy behaviour (Braley, 2016; Davison &Birch, 2001; Maitland et al., 2013). For instance, parents can control and restrict the S-RS behaviours, including the duration and frequency of watching TV or using electronic devices.

While supportive practices and strategies (i.e. restricting, encouraging) are crucial for the development of health behaviours of children and their self-regulation, in order for these supports to be effective, parents need related skills, knowledge and confidence, particularly with barriers they face (Fuller, Byrne, Golley, & Trost, 2019; Jarvis, Harrington, & Manson, 2017). In this regard, based on principles of socioecological model for health promotion (McLeroy, Bibeau, Steckler, & Glanz, 1988) studies have identified various barriers that parents face towards changing children's behaviours, particularly their eating, PA and SB (Dwyer, Higgs, Hardy, & Baur, 2008; Fuller et al., 2019; Heskeath et al., 2012; Jarvis et al., 2017; Minges et al., 2015; Pocock, Trivedi, Wills, Bunn & Magnusson, 2010). Thus according to socioecological model, the barriers are grouped as intrapersonal (i.e., individual child or parent characteristics), interpersonal (i.e., influences from social networks like friends and family), and broader environmental factors (i.e., community and external influences). Child's preference, peer pressure, parents' time constraints, are some of the reported factors that can impact the efficacy and type of parents' strategies to control the child's diet, PA and SB.

1.7 Parents' perception of weight status and health behaviours

As it was stated before, perceptions, beliefs, attitudes and knowledge regarding obesity and healthy behaviours including PA and SB are important contributors to CO (Davison & Birch, 2001; Golan & Crow, 2004; Hardy et al., 2007; Jones et al., 2007; Rich et al., 2005). The extent to which parents encourage their children to participate in PAs and healthy behaviours is related to their perception of the weight status and activity level of their children as well as their beliefs and attitudes toward the importance of healthy behaviours (Corder et al., 2012; Grewal, 2013; Sylvetsky-Meni, Gillepsie, Hardy & Welsh, 2015; Tompkins, Seablom, & Brock, 2014; Tschamler, Conn, Cook, & Halterman, 2010). Therefore, if parents do not realize their child's weight status and the potential health problems, they may be less inclined to encourage them into healthy behaviours (Tompkins et al., 2014; Tschamler et al., 2010). In contrast, parents who can accurately recognise a weight problem in their child, will be more likely to implement appropriate health behaviour changes (Golan & Crow, 2004; Parkinson et al., 2015; West et al., 2008). These changes include improved eating habits, increasing PA, and decreased SB (Cottrell et al., 2007; Mooney et al., 2010; Park et al., 2014). Therefore, parents' accurate awareness of their child's weight problem is introduced as a key variable, which determines a family's readiness for change of their child's environment and lifestyle (Towns & D'Auria, 2009). In fact, recognizing and identifying children as overweight by parents, is the initial step for prevention, diagnosis, and treatment of childhood obesity (Boa-Sorte et al., 2007; Maximova et al., 2008; Young, Debry, Jackson, Metos, & Templeman, 2010). This will be explained in details by the related theoretical framework of behavioural change later in this chapter.

Several studies show that parents' misperception of their child's weight can impact on their awareness of activity levels of their child such that considering their child's weight as normal results in them assuming their child has sufficient activity levels (Corder 2010; Eckstein et al., 2006; Grewal 2013; Mathieu, Drapeau & Tremblay, 2010).

Moreover, regardless of children's weight status, it is shown that parents' perception of their child's PA impacts children's activity levels (Chiang, Molin, Byrd, & Crawford, 2009; Corder et al., 2011; Greca et al., 2016). Parents who assume their children are active enough, don't realise their children's low activity levels. Hence, they do not encourage their children to increase their activity level and are less likely to participate in obesity management intervention programs (Corder et al., 2010; Greca et al., 2016). Similarly, parents' perception and awareness of SB of their children is reported to be beneficial for reducing this risky behaviour among the children (Grewall, 2016). As PA and SB contribute to general health and weight of children, parents' recognition of these behaviours in children is important for both overweight and normal weight/healthy weight children (Corder et al., 2010; Grewall, 2016).

It should be noted that the term "normal weight" is currently changing in research and is being defined as "healthy weight". However, due to literature most frequently referring to "normal weight" this term will be used throughout this thesis for consistency.

1.8 Children's perception of their weight and health behaviours

Parents' accurate perception of weight and health behaviours of children is important not only for behavioural change but also in terms of influence on their child's self-perception (Bois et al., 2005; Corder et al., 2012; Eccles et al., 1998; Jones et al., 2010; Maximova et al., 2008; Shiely et al., 2017). Children's self-perception and awareness of weight status and health behaviours are also important for preventing and treating CO as well as modifying their risk behaviours (Cai, et al., 2017; Corder et al., 2010). For instance, when overweight children perceive their weight as normal, they won't consider it as a threat to their health and are less likely to improve their risky behaviours (Cai et al., 2017; Maximova et al., 2008). Thus, children's self-awareness can encourage them to adopt a healthy lifestyle and when they become adolescents, they rely on their self-perceptions and attitudes of health behaviours (Grewal, 2013).

1.9 Perceived competence and FMS awareness

In addition to actual FMS, perceived physical competence (children perception of their FMS) is also proposed to be associated with PA participation (Harter 1978; 1988; Stodden et al., 2008). Harter believes that perceived competence affects a child's physical engagement more than actual level of FMS, as feelings of competent and mastery over particular activities motivate persistence in a task and maintaining the participation in activity (Harter 1978; 1988). Stodden et al. (2008) conceptual model as stated earlier propose that reciprocal relationship between FMS proficiency development, PA involvement and weight management can be mediated by children's perceived competence. This model suggests that children who have higher FMS proficiency may be drawn into a positive spiral of engagement in which high levels of motor skill competence is significantly related to high perceived motor skill competence and, subsequently, results in higher levels of PA (Stodden et al., 2008; Tammelin, Nayha, Hills & Jarvelin, 2003). While children with lower perceived motor skill (due to their low actual FMS level) prefer to avoid engagement in activities and will be drawn into a negative disengagement spiral as they believe they are not as good as their peers (Stodden et al., 2008; Tammelin et al., 2003).Therefore they will opt out from physical activities and this will ultimately result in high levels of physical inactivity which will place these individuals at risk for being obese during later childhood, adolescence and adulthood. This model suggest that these relationships strengthen as children age which is due to the influence of their more accurate perceived physical competence as a result of increased cognitive ability (Barnett et al. 2008; De Meester et al., 2016; Stodden et al 2008).

Identifying perceived competence, as an intervening factor that impact PA of children through their actual competence, has resulted in large body of research examining the relationships between perceived and actual motor competence with PA during childhood (Pesce, Masci, Marchetti, Vannozzi, & Schmidt, 2018). Perceived competence has been identified by longitudinal studies as a mechanism through which children's actual motor competency shifts into a physically active and healthy lifestyle during adolescence (Barnett et al., 2009; Khodaverdi et al., 2015; Pesce et al., 2018). In a systematic review by Babic et al. (2014) examining the relationship between the perceived physical competence and PA, moderately positive associations have been reported among 59 studies which this association is shown to enhance with age (Babic et al. 2014; Liong, Ridgers & Barnett, 2015; Utesch, Dreiskämper, Naul & Geukes, 2018).

Although it is proposed that this relationships strengthen as children age (Barnett et al. 2009 ; De Meester et al., 2016; Stodden et al 2008), studies show that children do not necessarily have accurate perceived competence which have impact on their PA participation (De Meester., 2016; Utesch et al., 2018). For instance, De Meester et al. (2016) found that children with high motor skill competence who are realistically aware of their competence level are more active than children with low actual physical competence that underestimate or overestimate their competence level. In addition, Utesch et al (2018) in their longitudinal study found that the more accuracy in perceived competence results in more PA one year later while inaccurate perception (either overestimating or underestimating) leads to lower PA one year later. Underestimation or overestimation can lead to lower future PA due to preventing children from improving their skills (overestimators) or not being motivated to participate in PA (underestimators) (Pesce et al.,2018; Utesch et al., 2018). Therefore, it is proposed that improving children's actual FMS and awareness of their skills (accuracy of their perceived physical competence) needs to be considered for promoting PA of children and healthy lifestyle (Inchley, Kirby, & Currie, 2011; Pesce et al., 2018).

Parents' awareness/ accurate perception of their children's physical competence is considered as an important factor for improving both children's perceived competence as well as their actual FMS (Jones et al., 2010; Liong, Ridgers, & Barnett, 2015; O'Neill et al., 2013). According to Newell's theory of Constraints, motor skills occur based on the interaction of three primary constraints that can limit, contain, or help shape the development of movement (Foulkes et al., 2015; Hamilton, Pankey, & Kinnunen, 2002; Newell et al., 1986). These constraints are as follows; the individual related factors (a person's structure and function), the task, and the surrounding environment (physical or socio-cultural factors). One example of environmental constraints is the family related factors such as parents' feedback and support (Foulkes et al., 2015). It is reported that parents' support and approval of children's physical abilities will influence children's self-perception of physical competence and motivation for PA participation (Harter, 1978; Jones et al., 2010). Parental support and approval of a child's physical ability along with the child's mastery efforts will lead to a positive self-perception. This favourable perception will improve a child's intrinsic motivation towards participation in physical activities and challenging opportunities in future

(Brustad, 1992; Harter, 1978; 1988; Harter & Connell 1984). Thus parents' beliefs about their children's FMS proficiency (physical competence) can shape and directly affect their children's self-perception of FMS proficiency which in turn can impact their actual FMS (Jones et al., 2010). Therefore, indirectly, the parents' perception affects children's PA participation. Furthermore when parents realize a poorly developed FMS in their child, they might be more motivated to support their children through providing opportunities for improving the child's physical abilities and encourage them to participate in FMS programs (Liong et al., 2015).

To conclude, parents and children's awareness/accurate perception of the child's FMS skills are important for improving the child's skills and increasing their PA level (Liong et al., 2015; Morano, Bortoli, Ruiz, Campanozzi, & Robazza, 2020; Stodden et al., 2016; Utesch et al., 2018).

1.10 Theoretical framework

In order to develop behaviour change interventions, understanding of the health behaviours and the contexts in which these behaviours occur is essential (Davis et al., 2015; Glanz & Bishop, 2010). Having a theoretical understanding of behaviour change is reported to maximise the potential efficacy of the interventions. A theory is a method of understanding events, behaviours, and/or situations in a systematic way thus relevant behaviour change theory can contribute to better program planning and skilfulness use of these programs (Davis et al., 2015; Glanz & Bishop, 2010). For instance, while PA is a complex behaviours to promote and modify, however applying a related theory based intervention is shown to increase the efficacy of the programs (Liu et al, 2018; Rhodes & Nigg, 2011; Rhodes, McEwan, & Rebar, 2019; Young et al., 2014).

There are various behaviour and behaviour change theories in literature. In a review by Davis et al. (2015), 82 theories of behaviour change that are applicable to individuals were identified. However, theories within social cognitive frameworks that emphasise cognitive variables and foundations of human learning are the most applied theories for various health behaviour change including PA (Rhodes et al., 2019; Young et al., 2014). The following theories are the most frequently applied theories: The Theory of Planned Behaviour (TPB), Social Learning Theory (SLT), Social Cognitive Theory (SCT, the updated version of social learning theory), the Information-Motivation-Behavioural-Skills Model (IMB), Self-determination Theory (SDT), Health Action Process Approach (HAPA), the theory of reasoned action (TRA), the health belief model (HBM), self-efficacy construct, the transtheoretical model/stages of change (TTM), and social support/social networks (Davis et al., 2015; Glanz & Bishop, 2010).
According to several reviews on the published research and articles (Davis et al., 2015 ; Glanz & Bishop, 2010; Glanz, Rimer, & Viswanath, 2008), of the above named theories, the most often used theories are TTM, SCT, HBM and TPB. In the recent review by Davis et al. (2015) TTM is the first most used theory in research.

TTM provides an appropriate framework for researching and intervening on multiple behaviours as it accounts for various degrees of readiness to change the behaviour (Driskell et al., 2008). Thus, applying this theory, enables modifying multiple behaviours through one single intervention program (Nigg et al., 2011). Considering that for tackling the epidemic of obesity, effective multiple behaviour interventions that include diet, PA and SB are necessary, the TTM is a suitable theory to be used in this area (Driskell et al., 2008).

Several theories of health behaviour including TTM, have proposed that recognition and intention to change an unhealthy behaviour are essential steps towards change (Park et al. 2014; Webb & Sheeran, 2006). A successful behaviour change depends on the recognition of the issue, which underlies the requirement for this change (Eckstein et al., 2006; Hudson, McGloin, & McConnon, 2012). In this regard, the TTM is an excellent framework for assessing both the child's and the parent's awareness and acceptance of the issue of obesity as well as their level of intention to change their behaviour for addressing the issue of CO (Mason, Crabtree, Caudill, & Topp, 2008).

Thus considering that TTM is widely applied for behaviour changes regarding the weight, PA and SB, and is a good framework for assessing child and parents' awareness of these behaviours, which are of interest in this thesis, it will therefore be applied and discussed in detail in this thesis.

1.10.1 Transtheoretical Model

The Stages of Change, also known as the Transtheoretical Model (TTM), is a widely applied cognitive model for behavioural change (Haas & Nigg, 2009; Prochaska & DiClemente, 1983; Prochaska &Velicer, 1997). While it was initially applied for changing smoking and other negative addictive habits (Lee, Park, & Kim, 2006; Marcus & Simkin, 1993), this theory (TTM) demonstrated to be efficient for changing various risk behaviours (Johnson et al., 2006; Morris et al., 2012; Prochaska et al., 2005). For instance, TTM is reported to be effective for modifying and adopting PA behaviour (Jeon et al., 2014; Lee, Park, & Kim, 2006; Liu et al, 2018). This theory identifies five stages for progression of behavioural change: 1) Pre-contemplation (person is not aware of the issue so there is no intention to change behaviour); 2) Contemplation (person is aware of the issue and changing the behaviour is seriously considered); 3) Preparation (person is ready to make change); 4) Action (modify behaviour); 5) Maintenance (trying to sustain behaviour). These methodical stages create organized changes toward a total behaviour change, which increase the chances of modified behaviour lasting longer (Howard, 2007; McKee, Long, Southward, Walker& McCown, 2016; Prochaska &Velicer, 1997). This model also integrates three more constructs; Decisional balance, Self-efficacy, and Processes of change, which are important for behaviour change and movement through the stages (Driskell et al., 2008; Johnson et al., 2006; Prochaska et al., 2005). These stages have been applied and recommended by researchers for CO intervention programs, which requires multiple behavioural changes including diet, PA and SB (Driskell et al., 2008; Haas & Nigg, 2009; Morris et al., 2012). Research shows that regarding risky behaviours, including obesity, the majority of people are in the pre-contemplation or contemplation stages (Howard, 2007; Sealy & Farmer, 2011). In regard with CO, Rhee et al. (2005) found that 44% of parents were in the pre-contemplation stage, in their study on parental perceptions and readiness to make lifestyle changes for their children. This represents that those who are in the pre-contemplation stage are unaware of their child's weight problem and health risks and, therefore, have no intention to change their behaviour (Howard, 2007; McKee et al., 2016; White et al., 2016). Their awareness could initiate the process of contemplating healthier choices for themselves and their families (Howard, 2007; McKee et al., 2016; White et al., 2016). Similarly regarding PA and SB, according to the TTM, initially, parents/children are not aware of the issue; therefore, in order to be ready to change their child's behaviour, they need to recognise their child's low level of PA and excess amount of SB (Corder et al., 2010; Grewal, 2013).

Many studies have found a relationship between awareness of weight status and healthy behaviours with different stages of change and also the effectiveness of the TTM on behaviour change of children has been confirmed by some. For instance, Rhee et al. (2005) in their study found that parents of overweight children who were aware of their child's weight problem were 16 times more likely to be in the preparation and action stages of change compared to those who were not aware. In examining the association between parents' awareness and stages of change, White et al. (2016) found that those who are more aware of their child's weight problem are more likely to be in more advanced stages of change.

However, other studies found different/mixed results. For instance, Haas and Nigg (2009) found a relationship only for some behaviours of children (moderate and vigorous PA) but not for others (light activity and SB). Some studies also found that while awareness existed for a behaviour, some parents /children were not in the action stage or there had been a relapse after a behaviour had been changed (Driskell et al., 2008; Hawkins, Hornsby, & Schorling, 2001; Sealy & Farmer, 2011). This is reported to be related to the type of behaviour being changed (less challenging) and the barriers that parents/children might face (Jakubowski et al., 2012; White et al., 2016). This indicates the complexity of issue and interelating factors beyond just awareness (Driskell et al., 2008; Sealy & Farmer, 2011). Thus in helping parents/children to move through stages of change and for a long-lasting behaviour change, besides awareness, they need support from health care providers in different ways including overcoming the barriers.

Therefore, examining parents'/children's awareness of the child's weight problem and unhealthy behaviours (e.g. low PA and FMS as well as high SB) are critical in modifying lifestyle. Understanding the factors that might impact on their awareness would be beneficial for future, informed interventions.

1.11 Culture

"All human beings are cultural beings" (Papadopoulos, 2018; 2006). Culture is the patterns of learned and shared behaviours and beliefs of a particular ethnic group which is learnt within the family and community (Caprio et al., 2008). Individuals' lifestyles, their personal identity as well as their relationship with others are influenced by their culture (Papadopoulos, 2018; 2006). Various countries have different cultures which demonstrate their uniqueness (Caprio et al., 2008; Peña, Dixon & Taveras, 2012). Concerning CO, culture is a critical contributor that has an impact in various ways (Caprio et al., 2008; Peña, et al., 2012; Renzaho & Mellor, 2010; Renzaho et al., 2008). For instance, culture affects the home environment, family lifestyle and practices including food intake, activity pattern, attitudes and beliefs towards obesity and healthy behaviours. Cultural related beliefs and practices among different ethnic groups may also influence differences in CO rates between groups (Sobal, 2001).

The relation between culture and some determinants of obesity i.e. weight status perception, PA, SB and FMS will be examined below.

1.11.1 Culture and weight status perception

There are various cultural norms and values towards body weight (Sobal, 2001). Approval and disapproval of body size varies amongst different cultures and ethnic groups (Caprio et al., 2008). Several studies show that the accepted body size for Caucasian (white) women is thinner than the ideal body size of black women (Caprio et al., 2008; Padgett & Biro, 2003). Also, a large body type is preferred among Latino/Hispanic and African/American parents who do not consider being overweight as a problem (Contento, Basch, & Zybert, 2003; Myers & Vargas, 2000; Town & D'auri, 2009; Young-Hyman, Herman, Scott, & Schlundt, 2000).

It is indicated that women's beliefs about body size are influenced by their culture and ethnic groups which impact on perceiving their child's weight status (Caprio et al., 2008). Therefore, cultural and behavioural factors linked to ethnicity are considered to have a significant influence on a mother's misperception of her child's weight status (Gualdi-Russo, 2012; Huang et al., 2007; Tompkins et al., 2014). Several studies have identified cultural beliefs as a deep-rooted factor for parents' misperception of their child's weight. In some cultures, a chubby child is considered as a healthy child and being plump is considered to be normal in the society (Aparícioet al., 2013; He & Evans, 2007; Jain et al., 2001). In Middle Eastern countries, culture impacts on peoples' preference for children's body shape, as they believe heavier children are more attractive than slim children (Davidson, Thill, & Lash, 2002; Kelishadi, 2007; Puraikalan, 2018).

1.11.2 Culture and PA

Studies on various ethnicities/cultures show that PA levels of Black and Asian children are less than white children (Al-Nakeeb et al., 2012; Eyre & Duncan, 2013; Trigwell, Murphy, Cable, Stratton & Watson, 2015; Woodfield, Duncan, Al-Nakeeb, Nevill, & Jenkins, 2002). Cultural values and norms affect family's preferences and criteria related to participating in PAs, which in turn impacts children's PA, as they model their family's lifestyle (Caprio et al., 2008). In fact, parents' perception of their child's PA and the amount of support for their child's PA are influenced by cultural values and norms (Trigwell, 2015). In this regard, it is shown that cultural attitudes can be a barrier to PA participation. For instance, in some countries, cultural and religious expectations of girls turn into a barrier (e.g. Somali, Saudi Arabia, and Iran). For instance, some sports are considered as inappropriate for girls to be practiced in public areas (e.g. cycling in public, swimming at the beach with swimsuit) and some sports require culturally accepted dress code for girls. Parents being over protective in Chinese culture is also a potential barrier for PA of their children. A convincing amount of evidence suggests that in many Asian countries, including the Middle East, academic achievement is very important for parents and is prioritised over PA (Dwyer et al., 2008; Mohammadpour-Ahranjani et al., 2014; Rothe et al., 2010; Trigwell, 2015). The importance of academic achievement is also shown to influence PA of children in schools in some Asian cultures/backgrounds (e.g. Korean, Iranian) Where some subjects, such as maths and science, have priority over PE, less time will be allocated to PE (Aubert, 2018; Mohammadpour-Ahranjani et al., 2014; Oh et al., 2018).

1.11.3 Culture and SB

The home environment (family influence) and sociodemographic, gender and age of children are some of known factors affecting SB of children (He, Harris, Piche´, Beynon, 2009). Different countries and cultures/ ethnicities have different home environments and lifestyles, which might impact on children's and adolescents' SB (Arundell et al., 2016). For instance, studies on various ethnicities in the UK show that Black and Asian children have higher levels of SBs, compared to white children (Brodersen et al., 2015; Eyre et al., 2013). Cultural norms and values also influence SB of children. A cross-cultural study by Al-Nakeeb et al., (2012) comparing SB of British and Saudi Arabian adolescents found lower SB among British adolescents and this was indicated to be related to sociocultural and environmental differences between the two countries particularly those that limits girls' activity patterns such as cultural and societal norms that lead to less opportunity for PA of girls and hence leading to higher SB. Considering TV viewing as one the main contributors to SB of children, a systematic review by Cillero & Jago (2010) proposed that specific demographic characteristics namely: living in a family with low socioeconomic status or from non-white ethnicities are potential factors that increase the young children's TV-viewing (Cillero & Jago, 2010). Sociocultural factors, are reported that impact on families' level of TV-viewing and parental rules for TV-viewing, that influence high screen-viewing among the children (Cillero & Jago, 2010). It is likely that the family rules to reduce TV viewing in some cultures work better, while other cultures may need different strategies (Dorey et al., 2009). Research suggests that Cultural-specific research is needed to determine the types of strategies that families use to reduce children's and adolescents' sedentary behaviour (Dorey et al., 2009; Arundell et al., 2016).

1.11.4 Culture and FMS

Culture and ethnicity have been shown to influence the FMS of children. A cross-cultural study on Belgian and American children, by Brian et al. (2018), found that cross cultural differences exist in actual FMS of children (Belgian children scored significantly higher than US children) but not in their perceived competence (Brian et al., 2018). In regard to ethnicity, several studies have proposed that Asian and Middle Eastern background children, living in Autsralia, have lower FMS skills than other children (Hardy, Reinten-Reynolds, Espinel, Zask, & Okely, 2012; Hardy, Mihrshahi, Drayton, & Bauman 2016; Barnett et al., 2019). Barrnet et al. (2019), in their recent study in Australia indicated that Asian children had lower FMS skills, specifically in their object control abilities, compared to English speaking background children. Sociocultural factors impacting PA of children has been proposed to impact Asian background children lower FMS level. For instance Asian parents emphasie on children's academic education which has priority over PA as well as their home invironment (parents and sibilings less modelling of low PA) are reported as possible factors contributed to lower PA which can lead to lower FMS of asian children in this study (Barrnet et al. 2019).

Chapter two

2.1 Introduction

The previous chapter provided a brief introduction to some of the issues pertinent to this thesis, culminating in a discussion of the role of culture. This chapter will discuss the rationale for why a comparison of Iran and the UK has been chosen as the cultural comparison for this PhD research. The first section summarises the environmental, cultural and socioeconomic context of both countries. The second section reports prevalence of obesity, Childhood Obesity (CO), Physical Activity (PA) and Sedentary Behaviour (SB) of children in the UK and Iran while briefly describing some available programs for tackling CO in both countries.

2.2 Environmental, cultural, socioeconomic context in UK and Iran

2.2.1 Geography, population and cultural characteristic

The United Kingdom of Great Britain and Northern Ireland (UK) is an island placed in north-west Europe with the area of 242,500 km2 (Commonwealth Secretariat, 2021). This country is a multinational and multicultural country which is made up of four different nations including England, Wales and Scotland (forming Great Britain) and Northern Ireland. The population of the UK is about 66.5 million (ONS, 2019) with unequal distribution across the four named countries as follows; England 84%, Scotland 8%, Wales 5% and 3% in Northern Ireland (Dillon & Smith, 2021). In addition, various ethnic groups and religions (e.g. Christian, Jewish, Muslim, Sikh, etc.) have made the UK a diverse society with a rich and varied cultures (Dillon & Smith, 2021). The main ethnic group is White and other significant groups are Asian, Black and Mixed.

Ethnic' populations within cities vary around the country with London being the most diverse ethnic city (40.2%) in England and Wales (GOV.UK, 2020).

Iran is the 18th largest country in the world, with an area of 1, 648, 195 km^2 located in the Middle East (Kelishadi et al., 2014). Iran has a population of approximately 83 million made up of a various mix of ethnic groups (nearly 26 groups have been reported) based on their language and religion (Aghajanian &Thompson, 2013; Mirzazadeh et al., 2009). The major ethnic groups with their specific culture are geographically located in specific locations. For example, Turkish and Kurdish people are in the West, Arabs are in the South and the Southwest, Fars (Persians) live in the centre of Iran, Turkmen are located in the Northeast, and Baluch reside in the East. Although ethnic groups have their own language, the main and official language in Iran is Farsi (Persian) (Mohammadpour-Ahranjani et al, 2014).

Regarding cultural identity, Iran is also a multicultural society consisting of three types of cultural identity including: National, Islamic and the Modern Identity (Karimifard, 2012; Saboori et al., 2015). National Identity originates from the Pre-Islamic Iranian civilization, Islamic identity is related to Post-Islamic Iran and the Modern is a result of the entry of modernity into Iran (Karimifard, 2012; Saboori et al., 2015). Prior to the Islamic Revolution of 1979, Iran was governed under a monarchy that favoured economic policies friendly to American interests, and promoted sociocultural standards associated with the Western world (Nourpanah, & Martin, 2016). After the Islamic revolution the country's leaders tried to replace western related legislation with standards associated to Islamic values, throughout Iranian society (Nourpanah, & Martin, 2016). For instance, the Islamic government enforced restrictions on social relations, the way people should behave and the separation of genders in public spheres (Evason, 2016; Mohammadpour-Ahranjani et al., 2014). Extreme restrictions imposed on women include their dress code and their involvement in society. Although women are restricted on their public involvement, many of them are university educated (in 2012 nearly 60% of university students in Iran were female) and have entered various professions such as law, engineering, politics, medicine and business (Evason, 2016).

2.2.2 Family culture and type

Similar to the culture of many traditional societies in developing countries, Iran is a collectivism culture in contrast to an individualism culture of industrialized western societies including UK (Ghorbani, Bing, Watson, Davison & LeBreton, 2003). As a collectivist society, Iranian people are dedicated to their family so that one's family honour or dishonour is shared between all family members (Hofstede, 1984; Evason, 2016). Every success makes the whole family proud and any dishonour impacts on the family which share the responsibility. In addition, in a collectivist society, peoples' behaviours are rooted in their cultural norms, therefore, as they want to comply with their society, changing unhealthy behaviours of society is challenging (Hendriks, Gubbels, Jansen & Kremers, 2012). This is while individualist culture is characterised by emphasise on individual instead of group, being independent rather than being identified with groups and personal goals and achievement prioritized over group goals (Ghorbani et al., 2003; Hofstede, 1984).

In terms of family type, the typical Iranian family household is an extended family including grandparents (Evason, 2016). In the UK, the predominant family type is a nuclear family though various family types do exist (Thompson, 2016).

2.2.3 Educational system

The Education system in Iran includes primary education, (from age 6 to 12) and high-school, (from age 12-18) (Hazari, 2015). In Iran education is compulsory until the end of grade nine or 15 years old. For each level there are many state/public schools (free of charge) as well as private schools (with tuition fees) available. Almost all Iranian schools are segregated for boys and girls (Hazari, 2015). Schools start in September and end in mid-June followed by the final year exams for each academic year (Nuffic, 2015, Qarehgozlou; 2018). In order to move to the next year of education, children need to pass final exams at the end of each academic year. Also, there is a national examination at the end of each school level which means that pupils need to work hard in order to pass the year and progress to the next level of education (i.e., from primary to high school and from high school to university) (Hazari, 2015) Which means that there is a lot of pressure on children towards academic achievement. The UK system extends from primary school (approximately age of 5) through secondary school which ends at approximately 15-16 years (GOV.UK, 2012; Nikolova, 2020). The majority of pupils in the UK attend state schools which are free of charge. There are two national exams during primary schools at the ages of 6-7 and 10-11 years and one exam at the end of secondary school (age 15-16 years). After this period, education is not compulsory and therefore students/children can decide on one of two routes. Individuals can decide to go into further education which can be either non-advanced (courses that lead them to find a job/ apprenticeships) or advanced (2 years sixth form) if they want to apply to or are interested in higher education at a university. In both countries various types of universities with different requirements and criteria are available. Recent statistics show that participations in higher education (i.e. university education) in both countries are high (50.2% in UK and 60% in Iran) which is also increasing (Department for Education, 2019; Evason, 2016; ICEF, 2015; UKuni; 2022). In addition, in both countries more females attend university compared to males.

2.2.4 Economy

Following the Islamic revolution in Iran, economic growth has been slow, though during the last decades there has been some economic recovery. This is due to the various significant factors such as war with Iraq (lasting eight years), a reduced price of oil, and imposed trade sanctions (Ghassemi, Harrison, Mohammad, 2002; Mohammadpour-Ahranjani et al., 2014). This poor growth in the economy has left Iran with the status of a lower middle-income country. Nevertheless, there has been improvements in infrastructures including roads, electricity, and safe water as well as health care (Aghajanian & Thompson, 2013; Mohammadpour-Ahranjani et al., 2014; Nourpanah & Martin 2016). In contrast the UK is one of the high-income countries in the world; ranking fourth high income country in the world (Estrada, 2017).

2.2.5 Health

Overall, the UK's health care system is one of the best in the world (Schneider, Sarnak, Squires, & Shah, 2017). Over the last decades the health care system of Iran has improved massively (Mehrdad, 2009; Nourpanah & Martin 2016; WHO, 2011) with remarkable improvements on health indicators and has exceeded performance targets set in regional areas These health indices include: coverage of vaccinations, life expectancy, decrease in mortality rates of infants as well as in children under 5 years old, access to health facilities, the incidence of communicable diseases and mortality statistics. In terms of health care efficiency, Bloomberg News (2016) ranked the UK as 21st in the world and Iran as 30th. This identifies these two countries as having the efficient healthcare systems, ahead of the United States and Brazil (Du & Lu, 2016). Unfortunately, in both countries, Non-Communicable Diseases (NCDs) are a main heath problem (LORDS, 2017; Nourpanah & Martin, 2016). In Iran the increase in the spread of NCDs is one of the major health issues that the MHME (the Ministry of Health and Medical Education of Iran) is facing (Nourpanah & Martin, 2016). In fact NCDs are a worldwide issue such that they impose a heavy burden on the healthcare development of countries and are responsible for two-thirds of deaths globally (LORDS , 2017; WHO, 2021). Of the NCDs, the first four major cause of deaths are Cardiovascular diseases (CVDs), diabetes, cancers and chronic lung diseases (Hunter, & Reddy, 2013; Saadat et al., 2015). About 89 % of reported deaths in the UK (LORDS, 2017) and 82% in Iran (WHO, 2018) are related to NCDs. In this regard, the main cause of death in UK is reported to be cancer and the second cause is the CVD while in Iran CVD is the first and main cause of deaths (Ali, Chowdhury, Forouhi, Wareham, 2021; Saadat et al., 2015). In UK It is also shown that CVD prevalence is higher in South Asian groups compared to White population (Ali et al., 2021). Unhealthy diet, physical inactivity or low PA, obesity and overweight, smoking and harmful use of alcohol, are modifiable risk factors contributing to increase in NCDs (LORDS, 2017; WHO, 2021). Of the mentioned modifiable factors, obesity is reported to be the major cause of NCDs, both in Iran and UK (Heart Matters, 2020; Nourpanah & Martin, 2016).

2.3 Obesity in UK and Iran

The Health Survey for England (2019) found that 64.2% of adults are either overweight or obese, of which 28% are obese adults (Baker, 2021). It was also found that overweight and obesity was higher among men compared to women (68.2% vs 60.4%) and around 3.3% of all adults were morbidly obese. In terms of its impact on people's health and the cost on National Health System (NHS), obesity is labelled as the "new smoking" by NHS England (NHS, 2014). It is reported that obesity is responsible for more than 30,000 deaths yearly in UK (PHE, 2017). The Obesity Health Alliance has estimated that by 2035, nearly 7.6 million cases of disease would be attributed to or associated with obesity and excess weight (BDA, 2018). Reports also show that obesity places approximately £6.1 billion per year on the NHS as well as £27 billion a year on the wider economy (DHSC, 2018; BDA, 2018; Baker, 2021). The cost on the NHS is estimated to be £8.3 billion in 2025 and £9.7 billion in 2050 (Baker, 2021).

In Iran, the rate of obesity has doubled during the last two decades and is more prevalent among children, women and people who live in urban areas (Kelishadi et al., 2014; Nourpanah & Martin, 2016; ShBU, 2019 Veghari, 2015). Obesity rates in adults in Iran are also very similar to that of UK. Findings of a national survey in 2016, reported the national prevalence rates of overweight/obesity among Iranian adults as 59.3%, of which 22.7% were identified as overweight (Djalalinia, et al, 2017; Djalalinia et al., 2020). The prevalence of obesity among females was double the rate in males; 29.8% and 15.3% respectively. Approximately 13% (50,000) of all recorded deaths in Iran for 2015 were reported to be caused by obesity and by being overweight (Tehran Times, 2018). With regard to the cost on health care systems, NCDs of which the most critical factors reported to be obesity and overweight, impose massive costs on health care system in Iran (Stice, Shaw & Marti 2006; Rahmani et al., 2015). For instance, it is estimated that the total national costs of diabetes mellitus in Iran amounted to $3,78 billion in 2009 (Javanbakht et al., 2011).

2.4 Prevalence of CO

Obesity in children is one of the biggest health issues both in the UK (DHSC, 2018) and Iran (Khashayar et. al., 2018; Kelishadi et al 2018). This is while children and adolescents (under the age of 16) compromise nearly 19% of the UK population (ONS, 2019) and about 24% of the Iran's population are children and youngsters under the age of 15 years (Tasnim, 2019). Among the 34 countries that are members of the Organization for Economic Cooperation and Development (OECD) for the prevalence of overweight and obesity in children, aged 2 to 19 years, the UK ranks 9th and is one of the worst in Western Europe (OECD, 2017; DHSC, 2018; NAO, 2020). Regarding the UK ranking for CO in the world, there is not any data available (NAO, 2020). As stated earlier the UK consists of four countries with different populations, which each have different CO rate. However considering that this research is conducted in England, where the main population of the UK are living (84%), the reported statistics in this chapter will only cover England. Nevertheless, when comparing the two studied countries throughout this thesis, to keep consistency with literature the UK is considered in general. Recent findings from the Government's National Child Measurement Program (NCMP) show that one-third of children aged 10-11 years and over one-quarter of children aged 4-5 years in England are overweight or obese (Baker, 2021), whilst among children aged 10-11 years, the obesity rate has increased by 3.5% (from 17.5 % to 21%) in 2019/20 compared to 2006/7 (Baker, 2021). The WHO project monitoring cardiovascular diseases (MONICA) in 1998, has considered Iran as one of the seven countries with the highest prevalence of childhood obesity (Baygi et al., 2012; Khashayar et. al., 2018; Kelishadi et al., 2003). The prevalence of obesity and of being overweight among Iranian children and adolescents is lower than the UK. The rate was reported in 2014, to be 5.1% and 10.8% respectively (Kelishadi et al., 2014). Higher rates have, however, been reported (overweight 9.4%, and obesity 11.4%) by a national study on 30 provinces of Iran in 2017 (Motlagh et al., 2017; Taghizadeh, Khodayari-Zarnaq, & Farhangi, 2021) and by the Ministry of Education (total 21%) showing a rapid increase (from 15.9% to 21%) in CO in Iran in less than seven years (MEDU, 2021). Considering the high rate of CO both in UK and Iran (which is higher in UK) this issue need to be addressed in both countries.

2.5 PA, SB and FMS of children in UK and Iran

According to the UK Chief Medical Officers' (CMO) PA guidelines, all children (aged 5-18 years) should participate in MVPA for at least 60 minutes and up to several hours every day (DHSC, 2019). In addition, engaging in different types of sports with various intensities during a week is recommended as it is useful for developing children's movement skills, bone strength and their muscular fitness. This guideline also suggests that children of all ages need to limit their SB particularly their screen time. Following international guidelines, in Iran also 60 minutes of daily MVPA as well as the need for minimizing children's SB particularly having less than 2 hours of screen time is recommend (Kelishadi et. al., 2016; 2017; Motamed-Gorji,et al, 2019). However in both countries children are not meeting the recommended PA and SB guidelines. This is while low PA and increased SB in childhood and adolescence are important determinants of obesity both in the UK and Iran (DHSC, 2018;

Esfarjani et al., 2013; Fuller et al., 2016; Kelishadi et. al., 2016; 2017; Motamed-Gorji,et al, 2019; NHS Digital, 2016; 2017).The following paragraphs will report some of the available statistics on PA level and sedentary time of children in both countries. It should be noted that all reported statistics are based on the self/parents reported data.

In England, children not meeting the recommended PA guidelines is reported that has affected the increasing levels of obesity (Fuller et al., 2016; NHS Digital, 2016; 2017). It was reported in 2015 that when excluding physical activities in school, just 23% of boys and 20% of girls aged 5-15 years met the recommended national level of PA. A recent report shows that only 18% of children meet the recommended level (NHS Digital, 2019). Similarly in Iran, evidence indicates that many Iranian children and adolescents have low level of PA and many are not meeting the recommended level of 60 minutes daily PA (Hovsepian et al 2016; Heshmat et al., 2018; Kelishadi et. al., 2016; 2017; Motamed-Gorji,2019 Taghizadeh et al., 2021). A national study on 30 provinces of Iran in 2011-2012, estimates that nearly half (46%) of children aged 6-18 are not meeting the recommended level of 60 minutes MVPA however the breakdown of PA level of children in different age groups is not reported (Hovsepian et al., 2016). Another study shows that nearly 23.5% of children and adolescents are physically inactive (having less than 30 minutes PA daily) with older children aged 12-18 years being more inactive (29%) compared to younger children aged 6-12 years (19 %). This study also reported higher level of inactivity for girls than boys; 33% vs 14% (kelishadi et al., 2017) which is much higher than the reported gender differences in PA of British children; 23% vs 20% respectively for boys and girls (NHS Digital, 2019). Nevertheless, due to lack of recent reports on PA levels of Iranian children in particular after-school PA, which was reported for British children, it is not possible to directly compare PA of Iranian children with British children.

Regarding SB, in both countries it is reported that children are becoming more sedentary and their sedentary time is increasing by age. According to data from Health Survey England (2015) sedentary time has increased with age, both during weekdays and weekends (Fuller et al., 2016; NHS Digital, 2016; 2017). For instance this survey reports that the proportion of children (aged under 10 years) who were sedentary for six hours or more, per day, was 9% for weekdays (excluding time at school) and 19% on weekends while the number is much higher for children 13-15 years old (nearly 20% for weekdays and 40% for weekend). In Iran also prevalence of SB is high among children and adolescents (Kelishadi et. al., 2017; Hovespin et al., 2016; Shokrvash et al., 2013). Considering screen time as an important contributor to SB, studies in Iran have mainly focused on screen time of children and have reported that prevalence of screen time among children and adolescents is increasing (Jari et al, 2014; Mortazavi et al., 2019; Mozafarian et. al., 2017). In this regard based on a national study conducted in 2011-2012, it was reported that of the total 13,486 children (aged 6-18 years) nearly 50% have more than 2 hours of screen related behaviours (Hovespin 2016). Another study with a same age range (age 6-18 years) and a bigger sample size (23,183 students) reported that nearly 70% of the total sample had more than 2 hours screen time (kelishadi et al., 2017). Direct comparison of sedentary time of children between two countries, due to lack of studies particularly on general SB of children in Iran, is not possible.

According to WHO (2019) in order to promote PA of children, various social, economic, cultural, technological, and environmental factors/barriers that might impact PA level of children should be identified and addressed with governments. Along with other countries across the world, in both the UK and Iran, low level of PA of children are attributed to various factors/barriers such as the cost of organized activities, parents time constraints, living in apartments, technology, safety concerns and transport which are also important contributors to SB of children (Dwyer et al., 2008; Grewal, 2013; Hart et al., 2003; Hesketh et al., 2005; 2017; Mohammadpour-Ahranjani et al., 2014; Pearson, 2011; Slater et al., 2010; Shokoohi, Hanif, & Dali, 2012). However there are some factors that are greater barriers in each of these two countries. For instance several studies, have reported weather conditions is a barrier to PA of children in UK (Eyre, Duncan, Birch, & Cox, 2015; Knowles et al., 2015; Rich, Griffiths, & Dezateux, 2012) while in Iran it is more of an issue mainly at the end of autumn and winter where the weather is cold (Mohammadpour-Ahranjani et al., 2014). This is related to the different climate of the two countries which in UK is mainly wet during a year with low temperature in most of the seasons while Iran has a hot and dry climate with warm spring, hot summer and short winter (WeatherOnline, 2021).While Iran has a better weather condition for outdoor PA, other factors such as environmental and cultural factors are greater barriers to PA of children in this country compared to UK (Kelishadi et. al., 2007; 2010; Mohammadpour-Ahranjani et al., 2014; Taghizadeh et al., 2021).

In general, low levels of PA in Iran are reported to be a consequence of fewer opportunities for PA participation in schools and communities which can also lead to more accumulation of SB (Kelishadi et. al., 2007; 2010; Taghizadeh et al., 2021). Similar to many developing countries, lack of open spaces and playgrounds both in schools and communities are a barrier for children's PA in Iran (Gupta et. al., 2007; Mohammadpour-Ahranjani et al., 2014). Although lack open spaces for outdoor PA is a concern in UK, there are government programs for supporting healthy environments and public open spaces for PA (Jones et al., 2009). For instance the Government action plan Choosing Activity have considered the importance of active free play in well-maintained open spaces through promoting cleaner, safer, greener spaces and improving quality of built environments across the country (Department of Health, 2005; Jones et al., 2009). In Iran, also some cultural values such as cultural restriction for girls or traditional emphasize on academic success are important barriers to PA of children (Mohammadpour-Ahranjani et al., 2014). A strong emphasis on academic performance from parents and school authorities exerts pressure on children for academic achievement which results in a decline in PA levels of Iranian children (Kelishadi et al., 2010; Mohammadpour-Ahranjani et al., 2014; Mozaffari & Nabaei, 2007). In addition, due to the great emphasis on academic achievements and children's educational success, in school, PE is not considered as important as other subjects. Which results in other academic subjects to have priority over PE and consequently PE sessions being replaced with those subjects resulting in insufficient PA and increased SB in school (Mohammadpour-Ahranjani et al., 2014). While emphasis on academic education is also an issue in UK (Griggs, 2012; Lynch, & Soukup, 2017), however recently as part of the government plan to control and address CO, increasing PA of children in school is a high priority (DHSC, 2018; PHE, 2020; RSPH, 2015). To do this government has allocated more funds to schools, PE sessions and curriculum have improved and various programs for PA promotion has been considered in schools (DHSC, 2018; Media Officer, 2020; PHE, 2020; RSPH, 2015). More comparisons regarding schools' system in both countries is provided in chapter six.

In regard to FMS, studies in both countries show that there is a need to improve children's FMS (Bryant et al., 2014; Badami, Nezakatalhosseini, Rajabi, & Jafari, 2014; Duncan et al., 2016; Khodaverdi & Bahram, 2015; Khodaverdi et al., 2016; Siahkouhian et al., 2011). Due to the importance of children's FMS for children's PA, health and weight, recently researchers in UK, are paying attention to this topic (Bryant et al., 2014; Duncan et al., 2016; Duncan, Jones, O'Brien, Barnett, & Eyre, 2018). Considering the impact of FMS on PA of children along with prioritization of PA of school children in UK, recently the national PE curriculum has changed. Besides increasing PA of all children, the new curriculum aims at developing children's FMS and help them to get mastery on these skills by providing various range of sports and activities in school (Media Officer, 2020). This is while, as mentioned previously, Iranian children have insufficient PA level in school and this subject is not a high priority subject in schools which can contribute to low FMS of Iranian children (Khodaverdi & Bahram, 2015; Khodaverdi et al., 2016; Siahkouhian et al., 2011). Studies and programs on FMS of children are also needed in Iran in order to help children improve their FMS, increase children's PA and thus help interventions to tackle CO.

2.6 Tackling CO in the UK

2.6.1 National Child Measurement Programe (NCMP)

In order to control obesity, the UK government in 2004 decided to attempt to halt the yearly rise of CO by the year 2010; and hence to fulfil this aim, in 2006, the NCMP was introduced for monitoring the progress in the planned target (Nnyanzi, Summerbell, Ells, & Shucksmith, 2016; Ells, Yung & Unsworth, 2010). This program is designed to measure height and weight of children (aged 4-5 and 10-11 years) in schools for calculating their BMI. Using children's BMI, overweight/obese children are identified and their parents informed through feedback letter. The identified children are then referred to the age-appropriate programs for further action (Nnyanzi et al., 2016). For instance, MEND run a program for 7-13 year olds. It is a family-based intervention aiming at changing behaviour of families through interactive 10 weekly workshops involving both parents/carers and children (Lucas et al., 2014). However, the MEND program has not been successful in getting parents of overweight children to take action for changing their child's behaviour or for asking advice from professionals (Saxena, 2017).Which, as it was stated in chapter one, may be related to complexity of the issue of CO as well as various factors and barriers that parents face, which according to TTM may put them in different stages of change (Driskell et al., 2008; Dwyer et al., 2008; Fuller et al., 2019; Heskeath et al., 2012; Howard, 2007; Jarvis et al., 2017; Minges et al., 2015; Sealy & Farmer, 2011; White et al., 2016).

2.6.2 A Plan for action

Due to the increased rate of CO in the UK the government's childhood obesity program "A plan for action" was published in August 2016 aiming to prevent the high rate of this epidemic issue (DHSC, 2018; PHE, 2020). Various strategies were adopted including a sugar reduction (such as a sugar levy on soft drinks), not selling energy drinks to children, and guidance on reformulation of high sugar foods for industry and calorie reduction programes. In addition, food labelling, restrictions on advertising unhealthy foods, health promotion encouraging nutrition and PA through schools and local authorities were implemented (DHSC, 2018; PHE, 2020).

Considering the critical role of school in forming and promoting healthy behaviours of children, this program has created some plans to support all children with high quality nutrition and at least 30 minutes of PA per day while at school (DHSC, 2018). In this regard, schools are urged to provide nutritious and healthy high quality, yet tasty food and drinks, to pupils in order to promote nutrition and healthy eating behaviours in all pupils (Department for Education, 2019). In addition, regarding promoting PA of children in schools, some plans were set out as follows; making investments of £1.6 million to support cycling and walking to school, encouraging schools to make sure that all children, particularly those least active children, engage in PA in school, and adopting a PA promotion program (DHSC, 2018).

Due to health of obese people being more impacted by Covid-19 compared to non-obese, in July 2020, the government introduced a new strategy for obesity in adults and children which is mainly focused on expanding some of the existing programs (NAO, 2020). This is while some of the interventions that the Department was committed to implementing in July 2019 (e.g. ban on selling energy drinks to children) have not yet been actioned.

The plan for action program, aimed at reducing CO by half by 2030, is reported to be extremely difficult if not impossible as more strategies and faster actions are needed to achieve this goal (BDA, 2018; Davies, Mytton, & Pawson, 2019). For instance, some proposed drawback of a plan for action program is that there are not enough interventions addressing deprivation as an important factor impacting CO and ethnic groups are not considered by national programs which needs to be considered (NAO, 2020). It is also reported that family–based multi component weight management programs and services should be provided by all local authorities, to address CO in the UK.

2.7 Tackling CO in Iran

Although the rate of CO is increasing rapidly in Iran, there are not enough intervention programs to tackle the escalating trend (Ezzeddin et al., 2019; Mohammadpour-Ahranjani et al, 2014; Sayyari et al, 2017). The majority of studies on CO are descriptive and are mainly examining prevalence and contributors to CO. There are limited weight management and PA promotion intervention programs in Iran but it seems that they are not successful. For instance, while a multi-disciplinary intervention program based on WHO program called Ending Childhood Obesity (ECHO) have been applied in recent years (i.e. Iran Echo) it is not implemented nationally (and is running in some states with the highest CO rates in Iran (Ezzeddin et al., 2019; Sayyari et al, 2017). In addition, recent reports show that this program has not yet been successful due to various factors such as economic sanctions against Iran, therapeutic approach in the health care system and the existence of coronavirus disease-19 (COVID-19) (Taghizadeh et al., 2021).Thus indicating that more political support is required from high level of government.

Due to the rapid increase in CO in children in recent years in Iran (21% vs 15% since 2014) and the impact of Covid-19 on activity levels of children, in December 2020, the Iranian ministry of education announced the implementation of a new intervention program in schools (MEDU, 2021).This programs is called “kouch” and has adopted a health behaviour promotion approach to control and prevent CO. The main strategy is reported as national measurement of children’s height and weight in schools for identifying overweight children and informing families. The aim is to help and empower families to change their unhealthy behaviours and improve their lifestyle. However as results of similar programs in the UK showed (Saxena, 2017), this program per se is not enough and a multidisciplinary program with support of various sectors of society may be needed.

In summary as discussed above the UK and Iran are two different countries in terms of social, economic, cultural and environmental characteristics. However, both countries have high educational attainment, efficient health care system, high rate of NCDs of which obesity is reported as critical factor that causes substantial cost on health care system of both countries. In both countries, prevalence of CO is high (although it is higher in UK) which needs to be addressed. PA and SB are two important contributors to CO in both the countries. Although the contributing factors to low PA and high SB in general are similar in both countries (e.g. cost of organised activities, technology, safety concerns etc.) the social, economic, cultural, and environmental factors impacts these behaviours differently in each country. Considering FMS as important factor for improving PA and preventing CO, FMS level is reported to be low in both countries, however in the UK it is something being focused on by researchers and authorities. Finally it was discussed that available strategies for tackling CO in both countries are not successful (although less has been done in Iran compared to UK). According to (WHO, 2020a), CO is a societal problem, which requires a culturally-related multi-faceted and multi-sectoral approach (WHO, 2020a).

Therefore, considering the discussed differences and similarities between two countries, and the critical need to address CO in both countries, along with intervention programs not being successful in addressing the issue of CO, there is a need to conduct this cross-cultural study between the UK and Iran. Results from this thesis therefore might be beneficial to improve and assist the design of culturally effective intervention programs.

Chapter three

3.1 Introduction

As discussed in chapter one, children's actual SB, PA and FMS levels are important factors contributing to their weight status and are influenced by family norms and cultures. In addition, parents' awareness (accurate perception) of their child's weight status, PA, SB and FMS are important for improving children's weight and healthy behaviours. The importance of children's awareness of their own weight, SB, PA and FMS for behaviour change was also discussed. Therefore, the aim of this chapter is to review in detail the studies examining the relationship between these factors, and in particular actual measurements versus parents'/ children's perceptions. Furthermore, qualitative studies on parents' views towards CO, PA, SB and FMS of children will be evaluated so that an understanding of why/how parents' misperception of the aforementioned factors exists can be further obtained.

3.2 Weight status awareness

3.2.1 Parents awareness of their child's weight status

Parental awareness of their child's potential weight problem is an important factor in the treatment of CO (Baughcum et al., 2000; Parkinson et al., 2017). According to research most parents of overweight children underestimate their child's weight and perceive it as normal. For instance, Town and D'auri (2009) in their review of literature of 15 quantitative studies found a large proportion of overweight children's parents (79%), perceived their child's weight as normal. A systematic review by Rietmeijer - Mentink et al., (2013) of 51 articles, showed that almost 60% of parents of overweight and obese children failed to accurately perceive their children as overweight (Rietmeijer – Mentink et al., 2013). In order to examine any improvement in parents' perception, a literature review by Tompkins et al. (2014) indicated that from 2006 to 2012, parental misperception of children's weight status has increased. They proposed that there has not been any improvement in parental perception of children's weight since the same review conducted in 2006 (Tompkins et al., 2014). Another systematic review by Park (2017) of eight studies in Asian countries (mainly south Asia) found the rate of parents' misperception of their child's weight ranged from 29.7 to 89.2%. Therefore, considering the high rate of parents' misperception of their child's weight status worldwide, improving their perception is critical for prevention and treatment of CO (Lundahl et al., 2014).

Several factors are identified as contributors to parents' misperception of their child's weight status. It is proposed that demographic factors such as age and gender of both children and their parents, culture, ethnicity, parents' education level, health literacy and parental BMI influence parents' misperception of their child's weight (Eckstein et al., 2006; Garrett-Wright, 2011; Manios et al., 2015; Maynard et al., 2003; Tompkins et al., 2014). The probability of being accurately classified by their mothers as overweight/obese was found to increase as children age (Campbell, Williams, Hampton & Wake, 2006; Crawford, Timperio, Telford & Salmon, 2006). Crawford et al. (2006) examined parental awareness of their child's weight status among 5-6 and 10-12 year old children in Australia. They found that of overweight and obese children, 89% of parents of 5-6-year-old and 63% of parents of 10-12-year-old children misclassified their child's weight status. In addition, Maynard et al. (2003) found that a child's age and gender are two predictors of maternal misperception and, as such, mothers of younger children were more likely to misclassify their child's weight compared to mothers of older children. The reason that mothers of younger children misperceived their child's weight more than mothers of older children was suggested as being related to the belief in parents of younger children that their child would outgrow obesity as they age (Jain et al., 2001; Maynard et al., 2003). However, solutions to this discrepancy, were not addressed in this study. Contrary to this, Polfuss et al. (2012) did not find associations between a child's age and nor gender in the relationship with parents' misperception of children's weight.

Parents' gender is also reported to influence their perception of a child's weight, such that compared to mothers, fathers are reported to be more concerned about their girls' weight problem and believe boys outgrow obesity (Mejia de Grubb et al., 2018). Mothers of girls are three times more likely to accurately perceive their daughter's weight compared with mothers of boys (Maynard et al., 2003).

Parents' misperception might also be explained by the influence of normative beliefs or perceptions regarding a child's body size (Eckstein et al., 2006; Raquel et al., 2010). Research shows that societal norms as well as cultural values regarding obesity impact parents' perceptions of their child's weight (Chan & Mareno 2014; Nobari et al. 2015; Park, 2017; Wang 2013). It is believed that local and regional prevalence of overweight /obesity increases the misperception of weight among people, thus it can be said that “what is common, becomes normal” (Binkin et al., 2013). Due to the current high occurrence of overweight people, overweight status may be considered average, thus people perceive it as ‘normal’ (Binkin *et al*. 2013). In this regard, a study by Hansen et al. (2014) examined whether a generational shift has affected parents’ perception of their child’s weight. Data was collected from two surveys (in 1988-1994 and 2005-2010) among children 6-11 years old with large samples (N= 2871 and N=3202) by asking parents whether they considered their child’s weight as being overweight, underweight or about the right weight. Their results showed that weight misperception has increased by 24 % highlighting the possibility of a generational shift to the social norm for body size (Hansen, Duncan, Tarasenko, Yan & Zhang, 2014).

The country of residence is another factor which may impact individuals’ underestimation of weight perception. It has been found that living in countries with higher obesity rates results in greater underestimation due to the normalisation of obesity (Binkin et al., 2013; Robinson et al., 2015; 2017). A study by Manios et al. (2015) on 6113 children aged 10–12 years and their parents across eight European countries (excluding the UK) found that both parents and children from Eastern and Southern Europe had higher levels of misperception, which may in part be due to there being higher rates of obesity in these countries compared to the other countries in their study. However, one limitation of this study is that the response rates for parents in some countries (e.g. Spain) have been lower than other countries participating in this study which might have impacted on the results.

In order to assess parents’ perception of their child’s weight status, question (verbal tool) and figure (visual tool) scales are two commonly applied measures (Pull & Aguayo, 2011). These classification measurements, i.e. word versus image/verbal versus visual, are reported to influence individuals' weight misperception. A commonly used verbal instrument is a question with a likert-type response scale, which asks participants 'How do you describe your/your child's weight?' They choose one of the provided options of very underweight, slightly underweight, about the right weight, slightly overweight, and very overweight (Pull & Aguayo, 2011). Visual instruments mainly use figure drawing scales with a series of frontal images, drawings, photographs, or silhouettes of "standard" bodies, ranging from underweight to obese, asking participants to choose one figure that represents their /their child's body size (Gardner & Brown, 2010; Stunkard, Sorensen, & Schulsinger, 1983). The perception is considered ''accurate'' if the perceived classification is similar to the actual BMI while any difference between the actual and perceived body weight is considered as inaccurate perception of weight (Pull & Aguayo, 2011).

Several systematic reviews show that (Rietmeijer – Mentink et al., 2013; Town & D'auri 2009; Tompkins et al., 2014) a verbal description was primarily used as a tool for assessing parental perception of children's weight status. Furthermore, these studies show that compared to verbal description, visual description is a more precise tool and produces more accurate data for the perception of weight status. To compare visual and verbal tools, a study by Eckstein et al. (2006) combined age–gender-specific visual sketches along with a verbal tool to assess parents' perception of their child's weight. Their results showed that parents were more accurate when using a visual (image) instrument compared with a verbal instrument. Similarly, Hussin et al. (2011) used both verbal and visual instruments (Children's Body Image Scale, CBIS; Truby & Paxton,

2002) to examine parents and children's weight perceptions. Their results indicated that although there was parental and children's misperception with both verbal and visual measurement, visual measures are more precise tools than verbal ones for both parents and children. It is proposed that this difference between verbal and visual instruments might be related to the negative connotation of the words "overweight/obese" due to the related stigmatisation in society (Rietmeijer – Mentink et al., 2013).

In contrast, some studies have reported better accuracy for the verbal tool compared to the visual tool (Chaimovitz, Issenman, Moffat & Persad, 2008; Moschonis et al., 2011). Chaimovitz et al. (2008) in their study that was conducted in the USA, reported a slightly better accuracy in utilizing a verbal (description) tool compared to a visual tool. The-sample consisted of 91 children aged 5-18 years and their parent/guardian. Results showed that 40% of children and 44% of parents underestimated the child's weight verbally, which was close to the results of the visual tool showing that 43% of children and 47% of parents underestimated the child's weight status (Chaimovitz et al., 2008). These similar results for visual and verbal tools, might be related to the methodology that was adopted. The visual instrument was developed by the authors and is not a well-known instrument. Furthermore, the visual instrument was not representative of a wide range of body shapes (i.e. consisted of just three figures). The study required participants to choose one shape from the three available options, even if it does not resemble their child's figure, while the verbal tool provided more options (i.e. 5 statements) for participants. Thus, as less figural options have been provided in visual tool compare to verbal tool with more options, it is difficult to directly compare their results. This is while most instruments have a wider range of figures that can increase the possibility of more accurate perceived classification by participants.

Some examples are seven figures/silhouette in Collin, (1991) and seven photographs in Truby & Paxton (2002) instruments. Therefore as it is suggested, future studies may benefit more from using tools that have a wide range of figures (Tompkins et al., 2014).

Another study by Moschonis et al. (2011) also has reported a better accuracy for a verbal instrument compared to a visual instrument on examining parents' perception of their child's weight status. In this study, the underestimation is reported as 15% for verbal while it is reported 41.3% for visual tool. This study was conducted in Greek with a large sample (n=1858) of children aged 9-13 years old. Parents' perception of their child's weight was examined visually through using the Children Body Image Scale (CBIS; Truby & Paxton, 2002) and verbally by using two questions asking parents to report their child's height and weight. Parents' perception then was compared with actual BMI of children. One highlighted reason for more accuracy with verbal tool is that CBIS tool is consisted of photographs of children that represent pre-pubescent children while most children in this study were in higher stage of sexual maturation (Moschonis et al., 2011). In this regard, a silhouette figure scale such as the one with Collin, (1991) might have been an alternative. In addition, regarding the verbal instrument, the majority of studies as mentioned before, have provided weight categories and asked participants to choose one that resemble their child's weight status. While in this study, parents are required to report their child's height and weight which has been then converted to BMI by researchers and the related category has been identified (Moschonis et al., 2011). This is also likely that parents' estimation of their child's weight and height have not been reported accurately.

Culture and ethnicity are identified to have a significant influence on mothers' misperception (Gualdi-Russo, 2012; Huang et al., 2007). Several studies have identified cultural beliefs as a deep-root of parental misperception such that some parents (e.g. African-American) consider overweight children as being strong or solid instead of being fat. Also, in some cultures (e.g. Mexican–Americans) children being chubby/plump is a social norm and a sign that children are healthy (Aparício et al., 2013; He & Evans, 2007; Jain et al., 2001). In Rosas et al.'s (2010) study in the USA, several of the mothers who were Mexican–Americans stated that in their Mexican culture the preferred body type for children was to be large, as heavier is often considered healthier (Rosas et al., 2010). Studies on Asian populations (mainly from East and Southeast Asia) also showed that Asian parents traditionally prefer 'plump' or 'chubby' children (Chan, & Wang, 2013; Park, 2017). This has been reported in Middle Eastern countries too (Davidson, Thill, Lash, 2002; Puraikalan, 2018). In Iran, this notion has been suggested to be a potential reason for parents' misperception of their child's weight (Kelishadi, 2007). Therefore, it is suggested that potential cultural and societal influences should be considered when addressing parents' misperception of their child's weight (Gualdi-Russo, 2012; Rosas et al., 2010).

Nobari et al. (2015) found that Asian-American mothers are more accurate in perceiving their child's weight than other ethnicities in Los Angeles (e.g. Hispanic/American). Their results showed that this difference is related to lower BMI of Asian-American mothers compared to Hispanic/American who have higher BMI, thus suggesting it is more related to BMI of Asian-American mothers and not related to cultural differences in accepted body size for children (Nobari, Wang & Whaley, 2015). Similar to this study, others found that parents with higher BMI are more likely to misperceive their child's weight status (Doolen, Alpert, Miller, 2009; Manios et al., 2015). However, a study on Chinese parents showed more accuracy for parents with higher BMI (Yao & Hillemeier, 2012).

3.2.2 Children awareness of their weight status

Regarding children's self-weight perception, very few studies have examined factors affecting a child's misperception of their own weight. Parents' misperception of their child's weight is proposed to influence children's misperception of their own weight (Huang et al. 2009a; Hussin et al., 2011). In addition, other variables such as children's age, gender, parents' BMI and employment status, country/region of living have been identified as factors which impact on children's self-weight misperception (Angoorani et al., 2017; Cai et al., 2017; Kelishadi et al., 2015; Manios et al., 2015).

In the study by Manios et al. (2015) on eight European countries, besides parents, children's (10–12 years old) self-weight perception was also examined. It was found that 42.9 % of overweight children underestimated their weight status. The results showed that underestimation was higher for boys than girls, for younger children, children of East and South European countries compared to other countries participating. Also, children of overweight and obese parents compared to children of normal weight parents, children of unemployed parents compared to those whose parents were employed had a higher level of misperception. However, one limitation of this study is related to the question they used to assess children's weight perception and this might have impacted on their results. Instead of asking children about their weight status categories (i.e. overweight, obese etc.) they were asked to estimate whether their weight is too much (e.g. 'I am a bit too fat' and

‘I am much too fat’). This may have biased the underestimation of their weight. Some contradictory results to this study have been found by other researchers some of which will be discussed below.

For instance, while Maximova et al. (2008) and Maniouse et al. (2015) found that children of overweight and obese parents are more likely to underestimate their weight status, Cai et al. (2017) showed contrary results among Chinese children (aged 7-12 years). This latter study found that children with normal weight parents are less accurate in perceiving their weight compared to children with overweight/obese parents. More inaccuracy was also reported for normal weight compared to overweight children (41% vs 25%).

Comparing the underestimation rate reported by Cai et al. (2017) i.e. 25%, with Manios et al. (2015) i.e. 42.9%, it seems that overweight Chinese children are more accurate than European overweight children in perceiving their weight status. The difference in misperception of weight among children is reported to be related to cultural/ ethnic differences that results in diverse social norms of accepted body weight (e.g. a chubby child being considered as healthy/normal weight) (Aparícioet al., 2013; Angoorani et al., 2017; Cai et al., 2017).

Therefore, considering the mentioned mixed results and limitations of available studies on both parents’ and children’s perception of the child’s weight status, more research is needed and this thesis hopes to address some of the gaps in the literature.

3.3 PA awareness

3.3.1 Parents awareness of their child's PA

As discussed in chapter one, parents need to be aware of their children's activity level in order to improve PA in children who are not active enough (Corder et al., 2010; Grewal, 2013). They need to know whether their children are meeting the recommended guidelines of at least 60 minutes MVPA in order to be able to increase their child's PA level so as to contribute to their health. In addition, this lack of PA awareness may prevent parents of overweight children from engaging in obesity intervention programs (Chiang et al., 2009) as well as not encouraging their children to participate more in PA (Corder et al., 2010; Hesketh et al., 2013). Limited studies examining parents' awareness of their child's PA or studies that compare parents' perception with actual PA of children, indicate that parents are not aware of their child's activity level and tend to misperceive it, and thus they cannot recognise the need to improve the activity level of their children. Nevertheless, the available studies have limitations regarding their methodology for measuring children's actual PA as well as parents' perception, such as mismatch between the two measures. These limitations, which will be discussed below, make it difficult to evaluate whether misperception has occurred or whether this is just an artefact of measurement.

Before discussing the studies, it is worthy to note that a common measure for assessing children's/ parents' perception of PA of children is a questionnaire (Corder et al., 2010; 2012; Grewal, 2013). Regarding assessing actual PA of children, various methods (e.g. diaries, interview, pedometers etc.) are available and have been used in studies (Bai, 2012; Sirard & Pate, 2001). However, over the last decades, accelerometers are widely used to objectively measure PA level as they can provide more reliable and valid data compared to other methods (Duncan, Roscoe, Faghy, Tallis, & Eyre, 2019 ; Fairclough et al., 2015; Migueles et al., 2017). Nevertheless, there are commercially available accelerometers' brands with different limitations/criteria (e.g. placement, sampling frequency, epoch length, wear and non-wear-time, wearing days, PA intensity cut-points), that have impact on the out coming results (Migueles et al., 2017). Some of the limitations/criteria are discussed below.

In examining the validity of the Health Survey for England parent-report questionnaire for physical activity, Basterfield et al. (2008) compared the results of data from accelerometers (hip worn) and parents' report of their child's PA (any kind of sports, organised activities, playing actively, and walking during the last seven days). Data was collected for 130 children aged 6-7 years old. Results indicated a big difference between children's actual time of PA and reported minutes by parents. Parents overestimated their child's MVPA. The study concluded that the questionnaire was not valid for a public health surveillance of PA. However, this overestimation might be related to the limitations of the accelerometers used in the study. The accelerometers were hip-worn ones (on a waist belt) which are limited in wearing adherence, especially for young children (Bassett & John, 2013; Fairclough et al., 2015; McNamaraet al., 2010; Migueles et al., 2017; Pagels et al., 2011). This type of device also requires parental supervision (Basterfield et al., 2008). In this regard, several studies show higher wear time compliance for wrist worn accelerometers compared to hip worn ones particularly for children (Fairclough et al., 2015; Migueles et al., 2017). Therefore, an accelerometers' placement site is an important criteria, for having more accurate assessment of PA, due to its impact on wearing compliance/adherence (Crouter, Flynn, Oody, Bassett, 2018). In addition, besides limitations related to location of accelerometers, the ones used in Basterfield et al.'s (2008) study could not record aquatic sports, and needed to be removed during these types of activities. These are two limitations of accelerometers (i.e. hip-worn and not water proof) which may have impacted on the results of this study as well as the ones below.

Corder et al. (2010) in their study on British primary school children (aged 9-10 years), examined parents' awareness of their children's activity level and found that the majority of parents (80%) of inactive children were not aware of their child's PA and they overestimated their child's PA level. They reported that girls and children with a lower fat mass were more likely to have their PA overestimated by their parents. Similar results were found by Hesketh et al. (2013) who examined parents' awareness of PA in 4 year old children in the UK and found that the majority of parents of inactive children overestimated their child's PA level. In both studies, similar methods were used: actual physical activity was measured through accelerometers and a question e.g. "How physically active would you say your child is?" was used to assess parents' perception of their child's PA level. Responses ranged from "very inactive, fairly inactive, neither inactive nor active, fairly active, to very active". In order to assess accuracy of parents' awareness of their child's PA, child's actual MVPA (measured by accelerometers) was compared with parent's perception (based on the question above). Based on the results, parents were categorized into different groups, comprising under-estimators, over-estimators, realistic active, and realistic inactive. For example, if a child's actual MVPA was less than the recommended 60 minutes, then the child was considered inactive and compared to the parents' response, he/she was assigned into the related awareness group. Studies by Corder et al. (2010) and Hesketh et al. (2013), although assessing PA perception, didn't provide questions concurrent with the results from accelerometers (MVPA), which are based on minutes spent on MVPA.

To overcome this limitation another study conducted in the USA, (Corder et al., 2012) used the same method but changed the question. This study used a daily closed question (for the duration of 7 days) which asked parents of children: "was your child physically active for a total of at least 60 minutes on this day" and the responses were "yes" and "no". The question used in this study measured parents' perception of the minutes their child spent being physically active every day. When compared to the actual MVPA, their perception was evaluated and they were assigned to groups of: underestimators, overestimators, realistic active and realistic inactive. However, Corder et al. (2012) did not actually explore the intensity of perceived PA by parents. With consideration of this limitation, in another study by Grewal (2013), parents were asked two questions regarding the perception of their child's MVPA, then the difference between their perception and accelerometer results was used to evaluate their awareness. These questions were adopted from the modified version of the School Health Action, Planning and Evaluation System (SHAPES) questionnaire and parents were asked daily recall of MVPA of children for four days (Friday-Monday). By asking parents to choose the hour (from 0-4) and number of minutes (from 0-45 with 15-minute increments) from the provided answers, intensity, duration and frequency were assessed. PA was measured using hip-worn accelerometers. A paired *t*-test was used to assess parents' awareness of their child's MVPA. Similar to other mentioned studies, the results showed that the majority (87%) of parents were not aware of their child's activity level and were also overestimating it. In this study, results from accelerometers were directly comparable to parents' reports in terms of the same measures i.e. minutes and intensity (MVPA). However, the questions were limited to the parents' recall ability. Using a series of questions with examples of different activities could increase the chance of parents/children being more accurate when assessing the child's PA level by helping them recall that activity.

Similar limitations relating to recall ability problems were seen in a study by Colley et al. (2012) that compared parents' reports of PA (MVPA) of children (assessed through questionnaire) with the actual MVPA of children (measured by accelerometers). The sample consisted of 878 Canadian children aged 6-11 years, which was part of the Canadian Health Measures Survey from 2007-2009. The questionnaire consisted of a main question on the hours their child participated in MVPA weekly followed by further questions asking the place of sport (i.e. school, sport club, home, etc.). The definition of MVPA was provided for parents to make it clearer for them on what was meant by these kinds of activities. Consistent with other studies, results showed that parents overestimated daily MVPA of their children (by 47 minutes).

A recent study conducted by Greca et al. (2016) in Brazil, showed that 85.6% of parents of inactive children and adolescents (8-18 years) overestimated their child's PA level. Parents' perceptions which were derived from a single question were then compared with the results of a Physical Activity Questionnaire for Children (PAQ-C) completed by children themselves. However, results of this study might not be accurate and it is difficult to generalize the findings due to limitations regarding their methodology. For instance, they used the PAQ-C questionnaire to assess actual PA of children while accelerometers are widely accepted measures for assessing actual PA (Cain, et al., 2013; Fairclough et al., 2016; Sirard & Pate, 2001). In addition, parents' perception was assessed through a single question which might not provide comparable data with the data produced by PAQ-C questionnaire that they used.

In summary, to assess actual PA, studies discussed above, except for the study by Greca et al. (2016) that utilized questionnaire, others used hip-worn accelerometers, which might not captured all children's activities due to the adherence limitation and hence impact the outcome (Fairclough et al., 2015; Migueles et al., 2017). In addition, only the study by Colley et al (2012) used waterproof devices so the results of other studies might have been limited due to not capturing aquatic sports. Thus choosing the right accelerometer (i.e. in terms of criteria/limitations) for the given situation, is critical for having more accurate assessment of children's PA level (Migueles et al., 2017). Furthermore, except for the study by Colley et al. (2012), PA awareness has not been examined in regard to the weight status of children. None of the studies examined to what extent parents' awareness may differ depending on whether they are parents of normal weight or overweight children.

3.3.2 Children awareness of their PA

Children's perception and awareness of their own PA levels is also important, as their self-awareness can encourage them to adopt a healthy lifestyle in the future (Corder et al., 2012). Thus, examining their awareness is beneficial for behavioural change programs and designing intervention programs. However, limited studies have examined children's awareness of their PA which their results show that majority of children are not aware of their PA. Similar to studies assessing parents' awareness of PA of children, available studies on children suffers from limitations, particularly relating to problematic measures of children's actual PA as well as their own perceptions of it.

Greca et al. (2016) in Brazil and Corder et al. (2010) in the UK assessed children's perception (N=306 and N=1892 respectively in Brazil and UK) of their own PA through a single question; 'compared with other boys or girls your age, would you say that you were: much more active, more active, about average, less active, or much less active'? Afterwards, the accuracy of their perceptions was assessed by comparing their perceptions with the actual MVPA. In Corder et al.'s (2010) study, children were then categorized into four different groups of under-estimators, over-estimators, realistic active, and realistic inactive based on whether they met the daily 60 minutes MVPA. In Greca et al.'s (2016) study children were categorized as either "active" or "inactive". Results of Corder et al.'s (2010) study showed 40% of inactive children overestimated their activity level. From the study by Greca et al. (2016), the overestimation rate for inactive children and adolescents was found to be 84.6%. However, as stated earlier, in the study by Greca et al., (2016), actual PA was measured through the PAQ-C questionnaire for children and was not assessed objectively, which might have impacted the results. In another study by Corder (2011) on 799 British adolescents (14 years old), they found that 52.6% of inactive girls and 64.8% of inactive boys overestimated their PA level. The same questionnaire to assess perception was used for this study as Corder et al. (2010) and MVPA was assessed objectively, where inactive children were identified as those who had less than 60 minutes of MVPA daily. The overestimation was reported to be related to lower fat mass, higher socioeconomic status, parental and peer support and being less teased among boys and girls (Corder et al., 2011). However, in these studies the measure of self-report was not concurrent with the measure from accelerometers which was based on minutes spent on MVPA, so data could not be directly compared. This, along with the limitations regarding the accelerometers they used for measuring actual PA (i.e. hip-worn and not water proof), might have impacted their results. In addition to that, none of these studies have examined awareness of PA separately for normal weight and overweight children.

The relationship between children's awareness of their PA and their BMI was considered in a study by Grewal (2013). They examined children's perception of their PA through the identical questionnaire with parents that was adopted from the modified version of the SHAPES questionnaire, which was previously explained (see page 83). A paired *t*-test was used to compare children's perception with their actual PA that was measured through hip-worn accelerometers. Their results showed that 83% of children aged 10-13 years overestimate their PA level. However, they did not find any association between children's BMI and their awareness. Similar to the limitation with the parents' questionnaire, the children's questionnaire was limited by recall ability and children's difficulty in assessing the intensity of PA.

Thus similar to what was discussed in parents' section, the limitations such as the self-report measures not being concurrent with the data from accelerometers, different accelerometers' criteria (hip worn and non-waterproof) as well as lack of studies comparing normal weight and overweight groups applies to the above mentioned studies on children.

3.4 SB awareness

3.4.1 Parents awareness of their child's SB

SB is an important factor affecting children's health and weight, so both parents and children's awareness of the child's SB is important in order to reduce this type of behaviour amongst children (Grewal. 2013). In addition, research is very limited in this area particularly with regard to children's awareness. TV viewing and screen time are reported as the most prevalent SBs of children and adolescents and therefore are the most commonly examined in the literature (Hardy et al., 2007; He et al., 2010; Pearson, 2011; Temmel & Rhodes 2013).

Regarding family, most studies have examined parental concern about their children's Screen-Related Sedentary (S-RS) behaviours (Cillero & Jago, 2010; Jaballas et al., 2011). He et al. (2010) conducted a study on 508 Canadian grade five and grade six children (aged 9-11 years) and their parents to examine their attitude, motivation and practices toward S-RS behaviours through a questionnaire. Their results showed that parents of children who spend more than two hours on screen, were less concerned about screen time of their children, had fewer negative attitudes towards excessive screen time as well as imposed fewer restriction rules at home, compared to those with children who spend less than two hours on screen. In their study, The Child Sedentary Activity Questionnaire (CSAQ) was used to capture children's recall of hours spent daily on the screen (for the previous week) outside of school. As SB was self-reported by children and was not measured 'objectively', this can be considered as a limitation for this study. In addition, it might be likely that concern and negative attitude regarding S-RS behaviour is a result of socially desirable answers or due to a lack of response options in the questionnaire.

In the previously mentioned study by Colley et al. (2012), parents' reports of SB and sleep duration, with regard to their children (assessed through questionnaire), was compared with the SB of children that was measured by accelerometers. Results showed that parents had underestimated their child's screen time, although the data reported from parents were different from the data captured from the accelerometers. Parents reported screen time, which is one aspect of general SB, while accelerometers identified or measured general SB.

In a systematic review examining correlates of general SB for children and adolescents aged 7-18 years, Temmel & Rhodes (2013) found a variety of factors (e.g. age, gender, socioeconomic status, ethnicity, social and family influence etc.) as correlates of SB in children, however these factors correlated differently depending on the types of SB. 'TV watching' and 'time spent on screen' were the most widely examined types of SB so the results of the study suggested that researchers and practitioners need to consider all types of SB when conducting research in this field (Temmel & Rhodes 2013).

3.4.2 Children awareness of their SB

In the previously discussed study by Grewal (2013), children's awareness of overall SB was also assessed. Perception of SB was assessed using two questions from the same survey (SHAPES) that they used for PA measurement (see page 83), asking about time spent in two types of sedentary behaviours on the last Friday, Saturday and Sunday:

1. Screen-based behaviours (e.g., TV watching, computer games)
2. Non-screen based sedentary behaviours (e.g. reading, doing homework)

Similar to PA perception, to assess parents and children awareness of SB of children, the same survey questions were used for parents and children; with parents responding about children's SB and children responding regarding their own SB. A *t*-test was applied to examine the awareness of parents/children of the SB of the child. They found that both parents and children underestimated the child's SB. However, the results might be limited as the two questions for assessing parents'/children's perception might not have captured all types of SB of children in accordance with the provided SB time measured with accelerometers. For instance, regarding non-screen related SB, they just asked about time spent on reading and homework and the overall SB was not measured. To the best of our knowledge there is not any other study assessing children's awareness of their SB.

In summary, as mentioned earlier, both parents and children's awareness of the child's SB can encourage them to adopt a healthy life style thus it is beneficial for reducing this risky behaviour among the children (Grewall, 2016). Despite the importance of SB awareness for behavioural change, there is not enough study and knowledge in this regards. As discussed above, studies in this area are scarce and the available studies are limited to not measuring overall SB of children which can cause mismatch between actual and perceived SB. This is a gap in the literature which needs to be examined.

3.5 FMS awareness

3.5.1 Children awareness of their FMS

As stated in the previous chapter, children's unawareness of their FMS (underestimation or overestimation) can lead to lower future PA due to preventing children from improving their skills (over estimators) or not being motivated to participate in PA (underestimators) (Pesce et al., 2018; Utesch et al., 2018). Therefore, it is proposed that not only actual motor skills competence per se but also accuracy of the perception (the difference between actual and perceived physical competence) needs to be considered for promoting PA in children and a healthy lifestyle (Inchley, Kirby, & Currie, 2011; Pesce et al., 2018).

For assessing the accuracy of children's perception (awareness) of their FMS level, two different approaches have mainly been used by researchers; variable-centred and person-centred approaches. Studies will be discussed below, starting with a variable-centred approach.

Considering that a higher correlation between perceived and actual FMS indicates a more accurate perception (Liong et al., 2015), in a variable-centred-approach, studies mainly have applied the correlation test between these two factors to examine the accuracy of children's/parents' perception of the child's FMS. Robinson (2011) examined the relationship between perceived and actual FMS among American preschool children with a mean age of 4 years. Children's FMS was assessed using The Test of Gross Motor Development – 2nd Edition (TGMD-2; Ulrich 2000a) which assessed 12 skills of children. Perceived competence was assessed using the physical competence subscale of Harter and Pike's (1984) Pictorial Scale of Perceived Competence and Social Acceptance for preschoolers. The physical competence subscale consists of six questions. Results showed a significant correlation between actual and perceived FMS, with gender differences also reported. Boys had higher levels of FMS and their physical perception was higher than girls, however the questionnaire they used (which consisted of 6 items) was not in line with the 12 item measure of actual FMS. In contrast with Robinson's study, Spessato et al. (2013) did not find a significant positive relationship between actual and perceived physical competence, although the instruments for measuring actual FMS (TGMD-2) and perceived competence (Physical Competence Subscale of Harter & Pike, 1984) was the same in both studies (Spessato, Gabbard, Robinson & Valentini, 2013). To find the relationship between BMI, actual and perceived physical competence, Spessato et al. (2013) conducted a study on young children (aged 4-7 years) in the USA. In contrast with other studies (Cliff et al., 2012; Erwin & Castelli, 2008; Okely et al., 2004; Poulsen et al., 2011; Southall et al., 2004) no significant difference in actual motor competence between overweight and normal weight children was found. Nevertheless, in line with other studies (Poulsen et al., 2011; Robinson, 2011) their results showed that overweight children's perception was lower than non-overweight children, while their actual physical competence was similar (Spessato et al., 2013). Results of the Spessato et al. (2013) study should however be taken with caution due to the fact that Harter and Pike's (1984) scale for assessing perceived motor competence is not closely linked to the TGMD-2.

Liong et al. (2015) in their study on Australian children (age 5-8 years) examined the association between children's and parents' perceptions of their child's physical competence (N=136) with the children's actual competence. The actual FMS was measured through the TGMD-2 scale measuring 12 skills and children's perception was assessed using the Pictorial Scale of Perceived Movement Skill Competence for Young Children (Barnett et al., 2015) which is a modified version of Harter and Pike's (1984) scale. This new scale is aligned with the skills measured as it assesses the perception of 12 skills of children that was assessed through the TGMD-2 scale. No significant correlation was found between children's FMS and perceived competence. These results might be related to the age of children; as stated earlier, younger children have less accurate perception due to their lower cognitive ability (Liong et al., 2015; Harter, 1978).

To examine older children's perceived competence some researchers (Bardid et al., 2016; Barnett et al., 2008; De Meester et al., 2016a; Weiss & Amorose, 2005) used the athletic competence subscale of the Self-Perception Profile for Children (SPPC; Harter, 1985; 2012). As with the Physical Competence Subscale of Harter & Pike's scale (1984), the SPPC scale (Harter, 1985) is not closely linked to the skills that are measured through the TGMD-2 instrument as it only assesses 6 skills of children. Regarding this issue, however, some researchers (Southall, Okely & Steele, 2004; Jonse et al, 2010) added 12 items to the Harter scale in order to increase the reliability of the test. Items were specifically related to those skills measured by the TGMD-2. Validity of the new scale was confirmed by Harter, who is the author of the pre-existing scale (Southall, et al, 2004; Jones et al, 2010). Applying the new modified scale, Southall et al. (2004) examined the relationship between actual and perceived physical competence among 142 children with a mean age of 10.8 years in Australia. Their results showed obese children had lower actual and perceived physical competence compared with non-overweight children. However, the accuracy of children's perception of their physical competence compared to their actual FMS was not reported (Southall, et al. 2004).

As stated earlier, in order to examine the accuracy of perceived competence some studies have recently used a person-centred approach compared to a variable-centred approach used by the studies discussed above. A variable-centred approach provides an average relationship by describing the strength of association between those variables, and thus enables the researchers to examine the level of agreement (mismatch/ congruence, also known as non-veridicality/veridicality) between perceived and actual perception (Magnusson, 1988; Pesce et al., 2018; Clark, Moran, Drury, Venetsanou & Fernandes, 2018). In a person-centred approach different groups are identified based on individuals' particular attributes or the relations between the attributes which in this regard are identified as realistic/accurate and unrealistic/inaccurate (including overestimate and underestimate). The following paragraphs review some studies in this regard.

Bardid et al. (2016) examined the difference between actual and perceived FMS on a sample of 161 Belgium children (aged 7.8-10.5 years). They assessed these variables through the Körperkoordinationstest für Kinder (KTK, Body Coordination Test for Children, Kiphard & Schilling, 1974, 2007) and the Dutch version of the new version of the Self-Perception Profile for Children (SPPC, Harter, 2012). Their analysis identified four profiles/groups of actual-perceived competence of which two groups were aligned with their actual and perceived competence (high-high and low-low). In addition, two groups were divergent (high-low and low–high). Overall, their findings showed that nearly half of children were unaware of their physical competence.

In another study by De Meester et al. (2016a) in the USA, the associations between actual motor competence, perceived competence, PA and BMI of children (N= 361 children, age range 6.9-11.8 years) were examined by using a person-centred approach. As a result of this approach, three groups were identified: two aligned (high-high and low-low) and one with different actual and perceived (low-high). Of the sample, 49% had an aligned/accurate profile and the rest (51%) had a divergent/inaccurate profile, which means nearly half of the children were inaccurate. The High-high group had higher levels of MVPA than the low-low and low-high group and lower BMI. However, they did not find significant differences in BMI of children in groups (low-high and low-low) suggesting that weight status influences the relationship between actual and perceived FMS. Their findings showed that generally children in this study had low levels of actual physical competence which the authors indicate might be related to the low socio-economic status (SES) of their sample as it is reported that there is a negative relationship between SES and actual physical competence of children (Goodway, Robinson, Crowe, 2010; McPhillips, Jordan-Black, 2007). In addition, the new version of the athletic competence subscale of the Self-Perception Profile for Children (Harter, 2012) was used to measure children's perceived competence, which as mentioned before, has a limitation of not being matched with the measured actual competence through the TGMD-2, which might have impacted the results of the study. Therefore, the results of their study should be interpreted with caution.

Clark et al. (2016) examined non-veridicality (agreement between) of actual and perceived motor competence among girls and boys in a sample of children (N=58) aged 8–10 years in the UK. The TGMD-2 was used to measure actual competence and perceived competence was assessed using The Pictorial Scale of Perceived Movement Skill Competence for Young Children (PSPMSC; Barnett et al., 2015). Results showed girls and boys have similar actual object and loco motor skills while boys have higher perceived object and loco motor skills. In general, girls underestimated while boys overestimated their FMS skills. Indicating this non-veridicality/inaccuracy in young children's physical competence is an issue which needs to be addressed by schools and stakeholders and considered in PA promotion interventions. Similarly, Pesce et al. (2018) in their study on 90 Italian children (aged 6-9 years) also found low levels of agreement between perceived and actual physical competence, with girls underestimating and boys overestimating their FMS skills (particularly object-control skills). The TGMD-2 and PSPMSC was used to measure actual competence and perceived competence respectively. However, in these two studies the association was only examined with child's age and has not been examined for normal weight and overweight groups.

In a longitudinal study, Utesch et al. (2018) examined whether children's accuracy (i.e. veridicality) of perceived physical competence/ physical self-concept is a predictive factor for their physical activity in future. This study was conducted in the west of Germany and in the east of the Netherlands. It included a sample of 718 third grade students (9 years old). The study continued over a year following the children into the 4th grade. Motor competence was assessed through measuring three object control skills, physical self-concept was assessed via a three item questionnaire and PA was assessed through a self-report questionnaire. Results showed that children who have higher motor competence levels and self-perceptions have higher levels of PA. In addition, it was found that children with more accurate perceived competence show more future PA. Underestimation or overestimation was found to lead to lower future PA, and this was more the case for underweight and overweight children compared to normal weight children. The authors indicated that improving both children's perceived competence and their actual motor competence should be considered for increasing PA of overweight and underweight children, though exclusively improving either of these factors alone is not recommended. Thus, they indicated that sports programs need to improve both children's perceived competence and their actual motor competence to enable them to achieve accurate perceived physical competence, particularly for overweight children. This study also has some limitations regarding the methodology that was used. Motor competence was assessed with only three object control skills, and perceived physical competence questions were not matched with the measured skills. In addition, PA was assessed subjectively through self-report questionnaire.

More recently a study by Morano, et al. (2020) using correlational tests examined the accuracy of children's perception of their FMS in a sample of 603 Italian children aged 6−7-years in regards to children's age and gender. To measure actual competence and perceived competence respectively, both the TGMD-2 and PSPMSC were used. Their results showed a very weak correlation between the two variables which they propose is related to the children's age as their cognitive capability is not fully developed (Morano, Bortoli, Ruiz, Campanozzi, & Robazza, 2020). Thus, due to their lower cognitive ability, their perception is less accurate (Liong et al., 2015; Harter, 1978).

3.5.2 Parents awareness of their child's FMS

As discussed, parents' perception of their children's FMS level is very important as it influences a child's self-perception and therefore their PA level (Eccles, Wigfield & Schiefele, 1998; Harter, 1998). However, few studies have examined parents' perceived competence and the child's actual FMS and only two studies have examined/reported the accuracy of parents' perceptions (Liong et al., 2015; O'Neill et al., 2013). The available studies on parents' perceptions of their child's FMS are discussed below.

Jones et al. (2010) examined children's and parents' perception of their child's physical competence in a sample of 1414 children (aged 9 and 11 years) in Australia. Actual FMS was measured by Get Skilled: Get Active checklists (Okely & Booth, 2000) and parents' perceived competence was assessed using a 15 item questionnaire by Wilson et al. (2000). Their results highlighted that parents of overweight children perceived their child to have a low level of FMS proficiency compared to parents of non-overweight children. The difference in parents' perception between the two groups was reported to be greater for older children (11 years old) compared to younger (9 years old) children. This was similar to children's perception, emphasizing the important role of parental perception on influencing children's self-perception. However, in this study the correlation between parents' perceived competence and actual FMS of children was not reported and the accuracy of parents' perception was not examined.

In a study on preschool children (N=264, 3-5 years old) in the USA, O'Neill et al. (2013) found that parents of children who have higher movement skills perceive their child's skills to be higher compared to parents of children who have low movement skills (O'Neill et al., 2013). The authors thus conclude that parents in their study are aware of their child's FMS level and suggest that in general many parents are reasonably aware of their child's FMS skills. However, it should be noted that in this study the difference/correlation between the children's actual FMS and parents' perception was not examined and their results are only based on the difference in parents' perception between different groups/tertiles of actual FMS (i.e. low, intermediate and high). This is while the correlation between actual FMS and perceived competence (parents/children) or the difference between these two variables are considered for examining the parents'/children's awareness (Inchley et al., 2011; Liong et al. 2015; Pesce et al., 2018).

Liong et al. (2015), in their study on Australian children (aged 5-8 years), also examined the association between parents' perception of their child's physical competence (N=136) and the child's actual competence. The actual abilities were measured through the TGMD-2 scale measuring 12 skills and parents' perception were assessed using a modified version of the PSPMSC for Young Children (Barnett et al., 2015) which is aligned with the skills measured. Their results showed a significant correlation between total scores of actual FMS and the parents' perception of that. This highlights the importance of educating parents about how to realise well developed physical skills from poor developed skills for improving movement skills and PA of children.

In summary, the reviewed studies on children's/parents' awareness of the child's FMS suggest that the association between perceived and actual FMS, which is referred to as accuracy of perceived competence or awareness of FMS, has been mainly examined among preschool children and adolescents while there are limited studies on children aged 8-10 years. In addition, there are methodological limitations in the studies such as the alignment of the measures. Furthermore, most studies have focused on the impact of gender on the association between these two variables while less has been done regarding the impact of the child's BMI.

One limitation regarding all the literature reviewed so far in this chapter, is lack of cross-cultural studies, particularly on PA, SB and FMS awareness. In the previous chapter the impact of culture on individuals' (parents and/or children) PA, SB and FMS levels, as well as on their perceptions towards heath behaviours of children was discussed. However, as the reviewed studies suggest, there is no study comparing parents' or children's awareness of these variables cross-culturally. Researchers are calling for culturally specific studies regarding these variables to improve the efficacy of intervention programs (Arundell et al., 2016; Barrnet et al.,2019; Brian et al. 2018; Trigwell, 2015), so a cross cultural study on parents' and children's awareness might be beneficial for these programs.

3.6 Qualitative studies

While there is often an emphasis in research on using quantitative methods (as evidenced by this chapter thus far), a qualitative approach contributes great insights and evidence to increase understanding of a topic through exploring people's attitude, values and perception (Jones et al., 2009). In addition, it is proposed that the use of qualitative research methods increases understanding of different cultures and communities. Which is important for improving the contextual frameworks that are needed for future research on those cultures and appropriate intervention programs (Mejia de Grubb et al., 2016; Pulakka et al., 2015).

Regarding CO, it is suggested that for improving the efficacy of CO intervention programs requiring parents' participation, qualitative and in-depth studies are needed (Staniford, Breckon, Copeland & Hutchison, 2011). Oude Luutikhuis et al. (2009), in their systematic review, indicate that to maximise understanding of why CO intervention programs are more or less successful, qualitative studies with parents are critical. Insights from qualitative studies might be beneficial for practitioners who are working on improving the efficacy of intervention programs aiming to reduce and prevent childhood obesity (Jones et al., 2009; 2011; Eli et al., 2014).

While quantitative methods are an appropriate way to examine prevalence of the problem of CO as well as the efficacy of intervention programs, there is a need for qualitative studies to examine parents' perspectives on the issue and the acceptable strategies for preventing or reducing obesity (Jones et al., 2009). Understanding parental perceptions of obesity, such as how they actually identify overweight in children, their perceptions and views on healthy behaviours and of how an 'overweight' child is formed is important for understanding why parents misperceive their child's weight and health behaviours(Jones et al., 2011). However, qualitative studies on parents' views on different weight-related factors are limited; it is reported that approximately 1% of the qualitative studies are related to obesity, thus researchers are calling for more studies in this area in different cultures (Figueroa, Saltzman, Jarick Metcalfe, & Wiley, 2017; Perez & Ball, 2015). Furthermore, the available qualitative studies are mainly on perceived barriers and attitudes towards weight, exercise and health among children (some of the studies will be discussed in the following paragraphs). Thus, there is a need to examine the underlying factors for parents' un/awareness of their child's weight and healthy behaviours including PA, SB and FMS.

For instance, although there has been growing research examining factors affecting parents' weight misperception (Eckstein et al., 2006; Garrett-Wright, 2011; Hudson et al., 2012; Maynar et al., 2003; Tompkins et al., 2014), a clear explanation for why parents misperceive their child's weight status has not been reported (Hudson et al., 2012) and underlying mechanisms of this misperception especially from a cultutral perspective have not been explored (Eli, Howell, Fisher & Nowicka, 2014).

A number of studies have proposed some psychological mechanisms that underlie parents' misperception of their child's weight problem (Jackson, Wilkes, & Macdonald, 2007; Pagnini, Wilkenfeld, King, & Booth, 2007; Southwell & Fox, 2011). It is reported some parents deny obesity in their children, because of the negative meaning of the term "obesity". They fear being stigmatised and blamed by others, due to their responsibility as parents, or being judged for their lack of knowledge. Also, the conflict of being a good mum/bad mum and parents' lack of resilience to face their child's weight problem are other psychological mechanisms involved

(Southwell & Fox, 2011). Parents' level of control over their child's weight problem, diet, PA, and their support are mentioned to be the factors that influence their resilience and perception of overweight in their children (Southwell & Fox, 2011).

Parents' unawareness of health consequences of obesity was proposed as an issue by Rich et al. (2005), through in-depth interviews with Hispanic mothers of overweight toddlers. Similar findings were also obtained in the study performed by Southwell and Fox (2011), through interviews with mothers of overweight/obese children. A recent study by Mejia de Grubb et al. (2018) on Hispanic parents' perception of their obese child's weight found that parents' lack of knowledge on obesity was reported to be related to parents' misperception of their child's weight (Mejia de Grubb et al., 2018). In this light, parents' lack of knowledge on identifying overweight/obesity has been reported as an underlying factor for their misperception.

In a qualitative study by Jones et al. (2011) on understanding parents' perceptions of their child's weight, a combination of quantitative and qualitative approaches was used. Focus group methods were applied to deeply examine parents' perceptions. Their results revealed that rather than using clinical references, parents used alternative approaches such as levels of PA and clothing size of their children or they compared their child's body size with extreme cases for identifying whether children are overweight. This was considered to lead them to deny overweight issues in their children and to detach themselves from this problem (Jones et al., 2011). This study had limitations though; the sample was predominantly Caucasian, which limits the generalisability of the results to other cultures, and it consisted mainly of mothers, so fathers' perceptions were not explored. Other family members such as fathers are underrepresented in studies on CO. Another study by Eli et al. (2014) used semi-structured interviews to examine parents' (including fathers) and grandparents' weight perceptions of pre-schoolers. They found that although parents were aware of their child's growth chart, they were not able to recognise obesity in their children. In addition, they considered the consequences of obesity to affect children in their future life and not the present. From their point of view obesity in children was attributed to genetics, as well as considered a result of "lazy" parenting (Eli et al., 2014). Similar to the study by Jones et al (2011), this study was limited by not examining the impact of culture on participants' perceptions of weight status of children.

Regarding PA, a study by Bentley et al. (2012) in the UK interviewed 23 parents about their views on children's PA. The results showed that the majority of parents believed their child to be either active or very active. In addition, their assessment of whether their child had sufficient PA was based on visual signs such as how energetic the child was, or their perception of their child's weight or body size, so that an active child was considered slim while an inactive child was considered overweight. This visual assessment may result in parents not accurately perceiving their child's activity level, and thus not realising a need for increasing the PA of their children. In addition, environmental factors such as cost, time limitations, lack of activity provision and weather were highlighted by parents as the main barriers to their child's PA. Parental support and the child's enjoyment of PA were introduced as important PA participation facilitators. The sample comprising participants just from one city in the UK (Bristol), with the majority being mothers were limitations of this study. In addition in this study weight status of children was not reported.

In another study by Pulakka et al. (2014) they examined parents' perceptions of children's PA and child development from different socioeconomic backgrounds and ages in a semi-rural area of Malawi. They used in-depth interviews with 16 parents, and a focus group discussion with six parents. It was revealed that practical skills, education and proper behaviour were introduced by parents as goals for their children. Being socially competent and quick in learning new skills, including motor skills and moving around were considered signs of being active. Having a balanced diet, being healthy and stimulation were considered as facilitators of PA participation in children. However, their sample consisted of more educated parents compared to average Malawian population which might have influenced their findings. In addition, the weight status of children was not reported in this study.

Nooran et al (2017) also explored parents' knowledge and perceptions of children’s PA outside of school by interviewing 11 parents. It was found that parents attributed PA of children to a healthy weight, which is consistent with the studies of Pulakka et al. (2014) and Bentley et al. (2012). In addition, they found parents were not aware of the PA guideline in the UK, and thus were not aware if their child met this guideline, which is in concordance with Bentley et al. (2015). They found the majority (90%) of mothers of young children were not aware of the PA and SB guidelines for their children, and thus defining and quantifying these behaviours in their children was not easy for them (Bentley et al., 2015). However, the study by Nooran et al. (2017) was limited to a small sample size from a highly deprived area, which limits generalisability of the results to other populations living in different areas.

In a systematic review of qualitative studies on parents’ perceptions of healthy behaviours of young children to prevent overweight and obesity, it is was found that parents believed a healthy diet plays a bigger role in preventing overweight and is more important than being active (Pocock et al., 2010). Some parents also indicated children's lack of knowledge regarding healthy eating and PA is a barrier for their healthy behaviour which requires educating children. Parents' knowledge regarding child weight management was found to be influenced by cultural and intergenerational opinions, and parents trusted suggestions made by family members more than professional advice. In addition, children's preference for sedentary activities was reported as a significant barrier for their PA.

One limitation regarding SB is that, most of the limited qualitative studies have examined parents' perceptions and views towards screen viewing as a type of SB. A study on Canadian parents of children 2.5–5 years old applying focus groups, revealed that the majority of parents were not concerned about the total time their child spent on screen viewing and instead they were worried about the content (He, Irwin, Bouck, Tucker & Pollett, 2005). In addition, screen viewing was considered educational, as a babysitter and a bedtime easing device which can also increase the family relationship and PA. Similar findings were reported from 24 focus groups conducted with parents (N=122 from low to medium-high SES) of children aged 4–6 years from six European countries (De Decker et al., 2012). Weather conditions and parental habits at home were reported the most important factors influencing children's screen time. Another study was conducted in New Zealand among parents of children aged 8-13 years with six focus groups (Dorey et al., 2010). TV was reported to play an important role in family's lives. In addition, factors such as parents not intending to decrease their own TV watching time, limited safe alternatives and the need to use TV as a babysitter were reported as barriers to reducing TV viewing time of children (Dorey et al., 2010).

Although there is an absence of qualitative studies on overall SB of children, a study by Knowles et al. (2015) interviewed parents of children (aged 2-11 years) about their perceptions of overall SB. The purpose of this study was to examine SB of children within the family setting in the UK and compare it with Granich and colleagues' (2010) conceptual schema of contributory factors to SB in the home environment which was conducted in Australia (Granich, Rosenberg, Knuiman, & Timperio, 2010). Consistent with Granich and colleagues' (2010) conceptual schema, Knowles et al. (2015) found that mothers are the main gatekeepers of the amount and types of at home SB of children. Factors such as role modelling, reinforcement, rules and restrictions impact the SB types, especially screen viewing at home (Knowles, Kirk & Hughes, 2015). They found that socio-cultural norms impact electronic media use among older children. It was also found that weather considered as an important contributor to SB of children in UK by parents, while the weather was not a main theme in Granich and colleagues' (2010) conceptual schema in Australia. The authors therefore suggest that intervention programs aiming at reducing SB of children should be culturally and contextually specific (Knowles et al, 2015).

Considering ethnic/cultural differences, Eyre et al (2014) examined it in parents' perception of environmental factors influencing activity level of children in a low socio economic area in UK (Eyre, Duncan, Birch, & Cox, 2014). Various physical and social related environmental factors such as poor access, safety and quality of the neighbourhood, rough neighbourhood perceived to reduce PA of children which also contribute to their higher SB (more TV viewing). However, no ethnic differences were found in their study, nevertheless this study although examined ethnic differences, it was in the same country which not consider the impact of environmental characteristics and differences between different countries.

Regarding FMS of children, and parents' perception of that, so for one qualitative study has been conducted. Roscoe et al. (2017) examined staff and parents' perceptions of PA and FMS skills of preschool children (aged 2-4 years) in North Warwickshire, England through focus groups. Their findings showed that parents are knowledgeable about FMS of children but some parents believed that it is the responsibility of preschool staff to promote these skills in children. In addition, while time, cost, health and safety concerns were highlighted as barriers to improving these skills, preschool and outside environments were perceived to be important facilitators of improving PA and FMS of children. Therefore, these results indicate more support and engagement from parents is needed to improve both PA and FMS of their children.

Considering what was discussed, there is a lack of qualitative studies on understanding and exploring the mechanisms of parents' misperception of their child's weigh, PA, SB and FMS. In addition the qualitative studies discussed above were limited in not examining the effect of ethnic and cultural differences on parents' perceptions (except the study by Eyre et al., 2014) and were also limited in considering mainly White population which reduces the generalisability of their results. As stated before, culture impacts the home environment, family lifestyle and their practices such as diet, activity pattern, as well as their perception and beliefs towards obesity and healthy behaviours (Caprio et al., 2008; Peña, et al., 2012; Renzaho & Mellor, 2010; Renzaho et al., 2008). Cultural related beliefs and practices among different cultures/ethnic groups are considered as some underlying factors for various CO rates between groups (Morales Camacho et al. 2019; Sobal, 2001). Thus conducting in-depth research to examine parents' perceptions of CO, weight status, PA and SB of children in families in different cultures is suggested for exploring cultural related underlying factors that impact their perception (Eli et al., 2014; Jones et al., 2011; Mejia de Grubb et al., 2016; Pulakka et al., 2015). Furthermore, in-depth research to improve understanding of motor competence of children in different cultures is also suggested by researchers (Brian et al., 2018). However, to the best of our knowledge there is no qualitative research on this topic.

3.7 Justifications for the present research

The literature reviewed here highlighted the importance of parents and children's awareness of the child's weight statuses, PA, SB and FMS. In addition, this review suggests that this awareness is important for the prevention and treatment of CO. However, findings across studies are not consistent and there is lack of knowledge on some variables (PA, SB and FMS) as well as in qualitative studies. For instance, some studies highlighted that higher parental BMI leads to both parents and children's underestimation of overweight (Maniouse et al., 2015; Nobari et al., 2015), while others found lower parental BMI can lead to more accurate perception for both parents and children (Cai et al. 2017; Yao & Hillemeier, 2012). This lack of consistency may, in part, be due to methodological differences in samples and measurement of actual and perceived PA, SB, FMS and weight status, which makes comparisons between these studies impossible. For example, weight status perception (Almoosawi et al., 2016; Gualdi-Russo et al., 2012; Lopes et al., 2013; Robinson & Sutin, 2016) is measured either verbally or visually. In the present research, both verbal and visual instruments will be used together to improve reliability as it is reported that there are differences in weight perception accuracy between verbal and visual tools (Tompkins et al., 2014). Although Eckstein et al. (2006) and Hussin et al. (2011) employed both visual and verbal tools in their study they used a different visual tool and different age groups than the current research. For instance, Hussin et al. (2011) used the CBIS (Truby & Paxton, 2002) which consisted of photographs of children. The photographs in this instrument are representative of Australian children and are based on Australian data which may differ with the weight distribution of other ethnic groups and cultures (Gage et al., 2012). Thus, the Collin's figure drawing scale (1991) for children will be used in this research which is appropriate for all cultures and ethnic groups (details of this scale is provided in chapter four).

Regarding PA measurement, the main limitation of the reported studies is that there is lack of an appropriate instrument to accurately assess PA levels of children. For instance, even where PA is measured objectively, almost all the reviewed studies used hip-worn accelerometers which have limitations regarding their wearing adherence, specifically for children. In addition, except for the study by Colley et al. (2012), the accelerometers used were not waterproof which makes them unable to record aquatic activities of children and so will not give the exact amount of PA. In the present research waterproof and easy to wear accelerometers (in the form of watches) will be used to objectively measure MVPA and SB of children. In addition, studies that assessed PA awareness, used a single question to assess parents and children's perceptions of PA which does not allow direct comparisons of different types of activities with the results from accelerometers (which assess actual PA). Furthermore, regarding SB awareness, a limited number of studies have measured mainly S-RS behaviours of children, but have not used accelerometers which have the advantage of capturing all types of SB. Thus, in the present research the Children's Leisure Activities Study Survey (CLASS; Telford, Salmon, Jolley, & Crawford, 2004) will be used to assess perceptions of PA and SB. This measures frequency and duration of a child's PA and, more importantly, measures the intensity of PA, as well as assessing all SB of children to enable comparing the results directly with the results of accelerometers (which assess actual PA and SB). Details of this tool is provided in chapter four.

Concerning FMS competency, in the current research perceived physical competence questions are matched with the measured skills of the TGMD-2 which makes comparisons more relevant and increases the reliability of the tests. In contrast, most studies used a questionnaire that was not matched with the tested FMS skills (Robinson, 2011; Spessato et al., 2013). Although a matched questionnaire is used by some researchers (Jonse et al, 2010; Southall et al., 2004), the accuracy of children's/parents' perceptions of the child's physical competence was not reported and the age group and the country in which the study was conducted (9-11 year olds in Australia) is different from the current research. Most importantly, none of the reviewed studies have examined parents' and children's awareness of SB, PA and FMS among overweight and normal weight children, so the current research will study this comparison.

As discussed, cultural differences impact families' environment and lifestyle which in turn impact the weight related behaviours of children as well as parents' and children's perceptions and awareness of those behaviours. Thus, in view of the lack of enough cultural knowledge of CO, PA, SB and FMS, and the high rate of obesity in developed and developing countries, comparing parents'/ children's awareness of the child's weight status, PA, SB and FMS between the UK (a developed country) and Iran (a developing country) is considered. Conducting cross-cultural studies can be beneficial as comparisons may reveal and explain potential differences, as well as similarities between different cultural contexts. This would enable examination of the extent to which parents' perceptions are universal or culture specific, which would help in designing beneficial interventions.

The literature reviewed also suggests that there is a lack of insights into the impact of culture on parents' perceptions and attitudes towards weight status, PA, SB and FMS of children. In particular there is lack of knowledge regarding the underlying factors that impact parents' and children's awareness of the child's weight status, PA, SB and FMS. As parents are the main gatekeepers of health behaviours in children, an in depth qualitative study would be useful to better understand and explain the underlying mechanisms affecting parents' and/or children's perceptions, attitudes and awareness in both cultures. Thus, the present research will use both quantitative and qualitative methods. As it is explained in details in chapter four a two phased sequential explanatory design will be used to address the research questions. Quantitative method will be conducted first to examine the research problem (phase one) which then is going to be followed by qualitative study to help explain the findings of quantitative method (phase two) (see pages 117-119).

Finally, the reviewed literature highlighted a gap regarding children aged 8-10 years, but this time of childhood is important for shaping and improving children's health behaviours. Most of the reviewed studies have examined either younger or older children (mainly pre schoolers and adolescents) than children aged 8-10 years old which is considered in this thesis (Barnett et al., 2013; Corder et al., 2013; Hussin et al., 2011 ; King et al., 2010; Robinson, 2011). While there are some limited studies on children aged 8-10 they have used different methods of measurement that have limitations (Corder et al., 2012; Huang 2009a; Morgan et al., 2008; Boise et al., 2005). Thus with consideration of the other reasons that are explained below, a study on this age group (8-10 years) is needed. Among pediatric populations, adolescents have higher SB and lower PA levels than younger children (Felez-Nobrega et al., 2020; Janssen, et al., 2016; Kelishadi et al., 2017). Thus, as activity patterns form from childhood, targeting this age group (8-10 years) can be beneficial to determine potential factors that affect their PA and SB prior to adolescence. Due to the transition to secondary school and change in children's behaviours including SB and PA (Janssen et al., 2016), it might also be helpful to examine whether parents and children accurately perceive the child's weight and health behaviour in order to modify their awareness and behaviours before they move to secondary school. In addition, regarding FMS as stated before for all children, basic FMS should be mastered by the age of 8 (Gallahue & Ozmun, 2006). However a decline in FMS levels of children aged 8-10 years is reported (Bryant et al., 2014), thus there is a need to improve FMS levels of this age group to increase their level of PA prior to adolescence (Bryant et al., 2014).This is while, the majority of studies have been conducted among adolescence or early childhood. Thus, understanding parents' and children's awareness of FMS of children in this age group might be beneficial for interventions aiming to improve the FMS of children and increasing their PA. In addition, considering that children in this age range have not experienced pubertal growth yet and thus girls and boys are biologically similar (Bryant et al., 2014; Malina et al., 2004; Thomas & French, 1985), this is a good time to explore factors that impact their FMS in order to develop their skills before they experience puberty. Finally, 8-10 years is an appropriate age to examine children's self-perception and awareness.

Harter (1982, 1999) proposes that by the age of eight children's cognitive abilities improve, and thus they form a perception of their general self-worth. Therefore, they are able to use their cognition to assess/judge their weight and health related behaviours, and thus provide insights for assisting the design of interventions to promote healthy behaviours and address CO. Consequently, the present research focuses on 8-10 year old children.

3.8 Aims of the present research

Adopting a mixed method approach, this program of research aims to examine and explain parents' and children's awareness of weight status, PA, SB and FMS of overweight and normal weight children aged 8-10 years old in the UK and Iran.

To fulfil the aim, this research will be conducted in two different phases; quantitative and qualitative phases. The first phase includes three quantitative studies (using questionnaires) which will be followed by qualitative study (using interviews) in phase two to help explain the results of quantitative studies. The studies in each phase are described below:

Phase one: Quantitative method (studies 1-3)

Study 1: British parents' and children's awareness of weight status, PA, SB and FMS of the child will be examined.

Study 2: Iranian parents' and children's awareness of weight status, PA, SB and FMS of the child will be examined.

These studies aim to examine: Parents' and children's awareness (accuracy of perception) of the child's weight status, PA, SB and FMS in normal weight and overweight children.

Objectives of studies 1 & 2 are to examine:

1) Actual PA, SB and FMS level of normal weight and overweight children aged 8-10 years.

2) The extent to which parents and children (aged 8-10 years) are aware of the child's weight status, PA, SB and FMS in normal weight and overweight children.

Studies (1&2) questions to address:

1) Are there significant differences in actual PA, SB and FMS levels between normal weight and overweight children?

2) Are parents of normal weight and overweight children aware (accurate in their perception) of their child's weight status PA, SB and FMS level?

3) Are normal weight and overweight children aware (accurate in their perception) of their weight status, PA, SB and FMS?

Study 3: A cross-cultural study will directly compare the results of study 1 and study 2.

The aim of this study is to examine British and Iranian parents' and children's accuracy level in their perception of the child's weight status, PA, SB and FMS level for normal weight and overweight children.

Objectives of study 3 are to:

1) Compare weight status and actual PA, SB and FMS levels of British and Iranian children.

2) Compare the accuracy of British and Iranian parents' perception (awareness) of their child's weight status, PA, SB and FMS level in both normal weight and overweight children.

3) Compare the accuracy of British and Iranian children's' perception (awareness) of their weight status, PA, SB and FMS level between UK and Iran in both normal weight and overweight children.

Study 3 questions to address:

1) Are there significant differences between British and Iranian children's weight status, PA, SB and FMS level for i. normal weight children and ii. overweight children?

2) Are there significant differences between British and Iranian parents in their awareness (accuracy of their perception) of their child's weight status, PA, SB and FMS level for i. normal weight children and ii. overweight children?

3) Are there significant differences between British and Iranian children in their awareness (accuracy of their perception) of their weight status, PA, SB and FMS level for i. normal weight children and ii. overweight children?

Phase two: Qualitative method (study 4)

Study 4: A cross-cultural qualitative study will examine British and Iranian parents' perceptions of CO, PA, SB and FMS of children.

The aim of study 4 is to explore the underlying factors that may contribute to British and Iranian parents'/ children's accurate /inaccurate perception of children's weight status, PA, SB and FMS.

The objective of this study is to deeply examine and compare British and Iranian parents' perceptions and attitudes toward CO, PA, SB, and FMS of children through interviewing parents in both countries.

Chapter four

4.1 An introduction to the methodological approach

This cross-cultural research has a mixed methods design, incorporating both a quantitative and qualitative component. This chapter provides the methodological underpinnings of the research by discussing the methodology that has previously been used to measure each variable in the quantitative studies of this thesis, discussion of some qualitative methodologies applied in the field of CO and related behaviours, followed by describing the methodology used in the qualitative study in this thesis.

4.2 Mixed method design

Mixed methods research means to adopt a strategy that employs multiple types of methods for addressing the research questions (Brannen, 2005; Bryman, 2012; Creswell, 2015; Creswell & Plano Clark, 2011; Dawadi, Shrestha, & Giri, 2021). As it is defined by Tashakkori and Creswell (2007) mixed methods design is:

"Research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or programe of inquiry." (Tashakkori & Creswell, 2007, p.4).

Mixed methods originated in the social sciences and is widely used in social and behavioural sciences (Creswell & Plano Clark, 2011). This methodology, has become popular in many countries and in various disciplines. The use of mixed methods has been broadened in various fields of health and medical sciences including nursing, family medicine, social work, mental health, pharmacy, allied health, and others among different population (e.g. youth, children, etc.). The refined and developed procedures also makes it suitable for a variety of research questions (Brannen, 2005; Creswell & Plano Clark, 2011). As proposed by Creswell and Plano Clark (2011), compared to a single method, mixed methods empowers a wider domain of understanding to be formulated throw mixing the two methods. The findings of the two methods can be combined either sequentially or concurrently, depends on the timing of the qualitative and quantitative approaches. In this context, timing is defined as *“the entire quantitative and qualitative strands, not just data collection”* (Creswell & Plano Clark, 2011, p. 65).

Concurrent timing means that the process of data collection, analysis and interpretation of both quantitative and qualitative methods occur in parallel (i.e. during a single phase/at the same time) and then are merged to compare the results (Creswell & Plano Clark, 2011; Dawadi et al., 2021). In contrast, Sequential timing means that the two methods (qualitative and quantitative) occur in two different phases such that one type of data is collected and analysed before the other data set. In this regards, various types of mixed methods designs are proposed. Creswell and Plano Clark’s (2011) proposed four major types of mixed methods designs as:

1) Triangulation Design; this include a one phase design in which both quantitative and qualitative methods are implemented at the same time with equal weight.

2) The Embedded Design; this type of design can occur either in one phase or in two phases. In this design one type of data (either qualitative or quantitative) plays a supplemental role through the overall design.

3) The Explanatory Design; consists of two phases, the first phase includes quantitative data collection and analysis which is then followed

by the qualitative data collection and analysis in order to explain and enhance the quantitative results (Creswell & Plano Clark, 2011).

4)The Exploratory Design; in this design which is also a two phased method, qualitative method is implemented first which can help to develop and inform the quantitative method in second phase.

Therefore, once a researcher decide to use mixed method, they need to choose which design is best for addressing the research question. For instance in regard with CO it is suggested that for determining potential contributors to CO, a sequential design adopting quantitative method first, and then developing a qualitative study after that might be helpful. As it is explained, this way, a quantitative method can be used to understand significant predictors of CO and following that a qualitative study (e.g. through interview, focus groups etc.) can be used to examine and explain the reasons why certain factors were significant (Dawadi, Shrestha, & Giri, 2021).

The rational for Explanatory Sequential Design in general is that in phase one, quantitative method can give a general understanding of the research problem while qualitative data in phase two can help to refine and explain the statistical findings of quantitative studies (Creswell 2003; Tashakkori & Creswell2007). This makes it, appropriate design to be used in this research.

Thus as it was discussed, considering that mixing the two methods are much more beneficial than using the simple method, for the purpose of this study, a mixed method approach using Explanatory Sequential Design, is considered. Quantitative studies in both countries will be conducted first (to examine awareness) which then will be followed by a developed qualitative method (to explain underlying factors for awareness).

4.3 Quantitative method

While there are different definitions for quantitative research, a very concise definition of quantitative research is given by Creswell (1994) as a type of research that *"explains phenomena by collecting numerical data that are analysed using mathematically based methods (in particular statistics)."* (Creswell, 1994; Sukamolson, 2007).

Quantitative research is mainly applied to obtain patterns and averages, make assumptions, and test theories. By applying this method, the results can be generalised to a wider population. Some common methods for collecting data in quantitative research include experiments, observations that are recorded as numerical values, and surveys (e.g. questionnaires). For the purpose of this research, an observation and a survey will be used (Creswell, 1994; Sukamolson, 2007).

4.4 Assessment of Weight Status

4.4.1 Body Mass Index (BMI)

Body Mass Index (BMI) is the most widely used method for measuring obesity and overweight world wide (WHO, 2021). A strong correlation between BMI and adiposity (excess body fat) has been reported for both adults (Fernandez et al., 2003) and children (Lindsay et al., 2001; NHS Digital, 2016). BMI is calculated using the following equation: kg/m2, where kg is mass and m is height of the person. BMI is the best way to measure the prevalence of obesity at the population level. It is easy to measure accurately and consistently across large populations, as it is a simple and feasible technique and does not require expensive equipment.

Therefore, it can be used widely around the world to provide comparisons between countries, regions, and population sub-groups (Team, 2015; WHO, 2014).

However, BMI is unable to detect excess adiposity and to differentiate between the fat mass and fat-free mass (Nevill et al., 2006; Shah, Radia, McCarthy, 2020). Which can reduce its validity when using in different ethnic groups (e.g. South Asian and Black African) with various body fat percentage and distribution (Hudda et al., 2017; Shah et al., 2020; Toftemo et al., 2018). For instance, South Asian people are reported to have genetically higher body fat, than White people at a given BMI, which is reported to increase their susceptibility to metabolic disease such as type 2 diabetes mellitus and cardiovascular disease. In this regard, to maximise identification of cardio metabolic risks among South Asian people, the WHO (2004) has suggested that for defining obesity in this group, a lower BMI cut-offs needs to be used (Caleyachetty et al., 2021). Similarly, in regard to children an adjusted BMI value according to population ethnicity is reported to be useful to address the BMI limitation of not being able to measure total body fat (Hudda et al., 2017; Toftemo et al., 2018). Results of a study by Hudda et al. (2017) in UK, showed that by measuring body fatness in a multi-ethnic population of children, BMI underestimates body fat of South Asian while overestimates Black African children's body fat. Therefore, they suggest that to have a more accurate assessment of body fat in ethnic divers populations, ethnic-specific BMI cut- offs are required. For instance, they suggested a positive adjustment of BMI of + 1.12 kg/m2 for South Asian population. Nevertheless, while adopting ethnic- specific BMI cut- offs are reported to be essential when identifying obesity in different ethnic groups , they are not currently used world wide (Caleyachetty, et al., 2021; Firman, et al., 2018).

Cole et al. (2000) declared that BMI should be used on children only as a guide and not an absolute reading. Siervogel et al. (2000) suggested that using additional measurement along with BMI, for children, might help to overcome the limitations. Nevertheless, due to the advantages, BMI is recommended by the international obesity task force and has been used widely in the literature (Barnnet et al., 2019; Clark et al., 2018; Cliff et al., 2009; Cole et al., 2000; Kelishadi et al, 2018; Kelleher et al. 2017; Okely et al., 2004; Rachel et al., 2011; Southall et al., 2004; Stodden et al., 2016). Therefore, in this cross-cultural study, BMI is an appropriate measurement for the classification of children's weight status.

BMI cut-off points are different between adults and children. The cut-offs for adults are as:

- Underweight < 18.5;
- Normal weight/Healthy weight = 20-25;
- Overweight = 25-30;
- Obese = 30-35;
- Morbidly Obese > 35.

In children, due to different growth rates, BMI cut-offs are not fixed, and it is necessary to take account of various growth patterns among them (Team, 2015; WHO, 2014). Therefore, to classify children's BMI, various cut-offs are introduced that are adjusted for age and gender (Team, 2015; WHO, 2014). These cut-offs are usually derived from a reference population (large sample of children), which is known as child growth reference (Dinsdale, Ridler, & Ells, 2011).

The cut-offs are commonly defined as centiles and z scores; thus, children's BMI/z score can be compared to the used reference. A wide range of children's growth references (with various cut-off points) has been proposed, which helps to classify children into different weight categories. This can provide the comparators with a general population (Dinsdale et al., 2011). Some of the widely used child growth references for the UK and international studies are British 1990 growth reference (UK90), Centres for Disease Control (CDC) chart (2000), The International Obesity Task Force (IOTF) (2000), and World Health Organization (WHO, 2007) charts. These references are briefly described in the following subsections.

UK90

The UK90 BMI reference, which is based on the 1990 reference curve data, provides BMI cut-offs for British children aged 0-23 years.

Using UK90 population thresholds, children will be classified as underweight: if BMI is less than the 2nd centile, Overweight: if BMI falls into the 85th centile, and Obese: if BMI falls into 95th centile (Cole, Freeman, & Preece 1995; Dinsdale et al., 2011; Team, 2015).

CDC

The CDC growth chart (2000) is another reference, introduced by the US Centre for Disease Control and Prevention (CDC), which can be used for children aged 2-20 years. This is an improved version of the 1977 NCHS and normalized CDC/WHO growth charts (Kuczmarski, Ogden, & Grummer-Strawn, 2000). CDC represents the racial/ethnic diversity of the US population (Dinsdale et al., 2011). For most routine assessments, if a child's BMI exceeds the 85th and 95th centiles he/she is at risk of overweight and obesity. If their BMI exceeds the 85th, for clinical purposes, the numbers increase to the 90th and 97th centiles. To define underweight, using this reference, the third and fifth centiles are used (Dinsdale et al., 2011; Kuczmarski et al., 2000).

IOTF

The International Obesity Task Force (IOTF) reference is used for classification of overweight and obesity among children and adolescents aged 2-18 years (Cole et al., 2000). The recommended BMI cut-off values are extrapolated from adult BMI cut-offs, which are the result of cross-sectional nationally representative surveys, from six different countries, comprising Brazil, UK, Hong Kong, Netherland, Singapore, and USA (Cole et al., 2000). Classification of overweight and obesity is in line with the values of adult cut-offs of 25 and 30, respectively. In addition, from equivalent adult BMIs of 16, 17, and 18.5, three levels of thinness are defined (Cole et al., 2000; Cole et al., 2007; Dinsdale et al., 2011).

WHO 2007

The WHO 2007 growth reference was developed by using the same methodology of the WHO Growth Standards for children aged 0-5 years old (Dinsdale et al., 2011; WHO, 2006; 2007). Data was derived from a combination of the USA National Centre and the WHO Multi-centre Growth Reference Study (MGRS), from Brazil, Ghana, Norway, India, Oman, and USA. This reference is appropriate for children aged 5-19 years and weight classification thresholds are based on the difference from Standard Deviation (SD), as:

Thinness: < -2 SD

Overweight: > +1 SD, < +2 SD

Obese: > +2 SD

The WHO 2007 and IOTF references are used internationally, however, they are not widely used in the UK and Iran. In UK, for population monitoring and clinical assessment of overweight and obesity of children older than four years, the UK90 is recommended (Dinsdale et al., 2011). The majority of obesity research in the UK has used this reference (Team, 2015). In Iran, the CDC reference is the most frequently used reference for assessment of overweight and obesity (Amini, 2007; Doustmohammadian et al., 2009; 2011; Kelishadi et al., 2008;2013; 2014; Motlagh et al., 2011).

Although the CDC is based on the American population, it is shown to be more appropriate than IOTF for classification of overweight and obesity in the Iranian population (Hajian-Tilaki & Heidari, 2013; Kelishadi et al., 2008). For example, Kelishadi et al. (2008) concluded that the CDC, compared to the IOTF, has a higher correlation with the national reference, which makes it an appropriate method for this population. In addition, Hajian-Tilaki & Heidari (2013) and Agha-Alineja et al. (2015), found that the CDC is more sensitive than the IOTF for assessment of obesity. Based on these results, UK 90 and CDC references will be used to classify obesity in the UK and Iran, respectively.

4.4.2 Skinfold body fat percentage

A commonly used method to measure total body fat percentage (BF %) is calculating the sum of skinfold thickness. In comparison with other methods, such as gold standard measurement of dual-energy X-ray absorptiometry, a high correlation of up to 0.9 has been reported with skinfold, which makes it a validated measure of BF% (Freedman et al., 2013; Hoffman et al., 2012; Wickramasinghe et al., 2008). This method of measuring body fatness is widely used in children to determine weight status (Lahti-Koski & Gillb, 2004). Many researchers have used this method as it is non-invasive, quick, and easy to use, which only requires a cost effective and portable device (calliper). Therefore, it can be easily applied to measure children's BF% in schools.

By using skinfold callipers, the thickness of subcutaneous fat from various sites of the body, including triceps, biceps, subscapular, suprailiac, and midaxillary regions, can be measured (either as single or multiple measures). Regarding the age and sex of participants, various sites of the body can be measured. Afterwards, depending on these sites, adequate equations are applied to calculate the BF%. Thus, when working with children, selection of measurement sites is important and needs to be considered carefully, regarding each specific population group (Hoffman et al., 2012).

Triceps skinfold thickness is a common measurement of BF% in children (Sardinha et al., 1999). An equation developed by Slaughter et al., (1988), can easily assess BF% of children by measuring their skinfold thickness of medial calf and triceps (Heyward &Wagner, 2004). Based on the advantages of the skinfold thickness method, it will be used to assess children's weight status in this research.

4.5 Weight perception assessment

Body weight perception is generally referred to as the individual's personal assessment of one's weight as "*underweight*" or "*normal weight*" or "*overweight/obese*" irrespective of the actual BMI (Bhurtun, & Jeewon, 2013; Tremblay, & Limbos, 2009). An individual's weight perception can either be concordant (when someone accurately perceives one's body shape and size) or discordant to the actual BMI (when there is a discrepancy between evaluation of one's body size and actual BMI) (Jones, 2015; Khambalia et al., 2012). The difference between the actual and perceived body weight is called body-image distortion and is considered as inaccurate perception of weight (Pull & Aguayo, 2011).

In order to assess different aspects of body weight image, a number of diverse perceptual measures (how people perceive their body size) and attitudinal measures (the way people like or dislike their body size) have been developed over the years for children and adults (Anderson et al., 1997; Collin, 1991; Gardner & Brown, 2010; Pull & Aguayo, 2011; Sherman et al., 1995; Truby & Paxton, 2002). These include questionnaires/questions, figure drawing scales, and examining individuals' cognitive, affective, and behavioural functioning (Gardner & Brown, 2010; Pull & Aguayo, 2011). In order to assess perception, question (verbal description) and figure (visual description) scales are two widely used perceptual measures (Pull & Aguayo, 2011) which are described below.

4.5.1 Verbal description

This is a widely used and simple method for assessing body weight perception. It is a question with a likert-type response scale, which asks participants 'How do you describe your weight?' and the following options are provided for them to choose one: very underweight, slightly underweight, about the right weight, slightly overweight, and very overweight (Pull & Aguayo, 2011). The participants could also be asked 'Do you consider yourself much too thin, a little too thin, just right, a little too fat, or much too fat?'. Afterwards, participants' answers will be compared to the actual BMI to examine accuracy in perceiving their weight (Mikolajczyk et al., 2010; Pull & Aguayo, 2011). These types of questions can be used for assessing children's self-weight perception while a modified version can be used for assessing parents' perception of their child's weight status. For instance, 'how do you describe your child's weight?'. Similar to the children's question, parents need to choose one answer from the given options of weight categories (Almoosawi et al., 2016; Lopes et al., 2012).

4.5.2 Visual description

The most frequently adopted instruments are figure drawing scales, known as visual description (Gardner & Brown, 2010). Figure rating scales are among the common instruments that are used for assessing weight perception and body shape dissatisfaction, in adults, adolescents, and children (Duncan, Al-Nakeeb, Nevill, & Jones, 2006; Lombardo, Battagliese, Pezzuti, & Lucidi, 2014; Truby & Paxton, 2002). These scales consist of a series of frontal images, drawings, photographs, or silhouettes of "standard" bodies, ranging from underweight to obese (Stunkard, Sørensen, & Schulsinger, 1983).

Typically, when this method is used to assess an individual's perception of his/her weight, they are presented with a series of drawings of body shapes and participants are asked to identify the body shape that they feel best resembles their actual body shape and size (Gardner & Brown, 2010; Lombardo et al., 2014; Pull & Aguayo, 2011; Truby & Paxton, 2002). The test may either be self-administered or performed by a third-party observer (Sherman, Iacono, & Donnelly, 1995). Either way, the assessor chooses a figure that looks most like the subject (Lombardo et al., 2014). For instance, children's scales can be used to have their self-perception or to have their parents' perception of their child's weight. These scales have several advantages: they do not require sophisticated equipment to administer and are easy and quick to use (Truby & Paxton, 2002). Compared with questionnaire assessments, they do not require verbal fluency. In addition, they can be used in different cultures for assessing the perceived body size, without a need for translation and back-translation, as they are visual (Lombardo et al., 2014; Shroff, Calogero, Thompson, 2009).

The first figure drawing scale called the Figure Rating Scale or FRS was developed as an easy-to-administer self-report measure by Stunkard et al. (1983), more than two decades ago (Gardner & Brown, 2010; Pull & Aguayo, 2011; Stunkard et al., 1983). During the past three decades, a considerable number of similar figure drawing scales have been developed, based on the Stunkard et al. (1983) scale, to assess various aspects of body image (Truby & Paxton, 2002; Pull & Aguayo, 2011). These scales have grown in number, type, popularity, and application (Branstad, 2003). Specification of the scales for a subject group seems to be important, as different groups (especially at different ages) have different body characteristics. For instance, several scales have been developed for different age groups, including adults (Anderson et al., 1997), adolescents (Sherman et al., 1995), and children (Truby & Paxton, 2002; Collin, 1991). Also, there are scales available for weight classes and different ethnic groups, including Caucasian and African-American (Patt et al., 2002; Stunkard et al., 1983; Williamson, Womble, Zucker, et al., 2000).

Regarding the importance of age-specific measures of body image, the adaptation of figure rating scales in children was developed by using more childlike silhouettes (Byrne & Hill, 1996). For example, Collin (1991) proposed a scale for children by modifying Stunkard's Body Rating Scale. This instrument was developed specifically to include silhouettes of children, and consists of seven frontal images of girls and boys, numbered 1 to 7 corresponding with increases in size from very thin to obese (Collin 1991; Welch et al., 2004). Collin reported a good test–retest reliability (R

= 0.71) for the selected figures (Collin, 1991; Heron, Smyth, Akano, & Wonderlich, 2013; Truby & Paxton, 2002).

In 2002, Truby & Paxton developed a pictorial scale called the Children's Body Image Scale (CBIS). This scale has been used widely to assess pre-adolescent and children's self-body size perception and their body dissatisfaction (Truby & Paxton, 2002, 2008). This scale (CBIS) is representative of BMI variation in Australian children, which uses photographs of children of known BMI and ranges through the normal percentile bands for both males and females, aged 7-12 years. One disadvantage of this is relying on two-dimensional representations of children (separately for girls and boys) with different BMI, which makes the results difficult to interpret. Another disadvantage is that the images are of Caucasian children and based on Australian data, which may differ from the weight distribution of other ethnic groups (Gage et al., 2012). It is suggested that the figure scales that include facial and body features of Caucasian ethnicity are not appropriate for a broad range of ethnic groups (Gardner & Brown, 2010; Thompson 1996; Altabe 1996).

Therefore, considering the multi-cultural nature of this research, Collin's scale (1991) will be employed as it has shown high test-retest reliability for use in participants of different ethnic/racial backgrounds (Collins, 1991; Heronet al., 2013). This scale will be used for both parents and children.

4.6 Physical activity (PA)

PA is a complex behaviour and its measurement is often a challenging procedure (Helmerhorst, Brage, Warren, Besson, & Ekelund: 2012; NHS, 2009). In order to achieve an accurate assessment of an individual's overall activity level, four main variables of PA need to be measured: frequency, intensity, time (duration), and type (NHS, 2009).

- Frequency: refers to how often an activity is performed i.e. number of sessions daily, weekly, and monthly.
- Intensity: represents how severe and hard an activity is. This parameter is categorized into four different levels which will be described in the next section.
- Time (duration): refers to how much time (in hours or minutes) is spent on a single bout of activity.
- Type: is also known as mode of activity and refers to different kinds of activities such as walking or swimming (NICE, 2006; NHS, 2009).

4.7 PA Intensities

Consumption of energy is a result of engaging in PA or exercise, which is generally measured in terms of intensity (Hills, Mokhtar, & Byrne, 2014). Intensity refers to the rate at which the exercise has been performed or the amount of effort that is required for doing an activity (WHO, 2017). There are different levels of intensity in performing PA, including sedentary, light, moderate, and vigorous (high) intensity (Ainsworth et al., 2000).

In order to measure the intensity of an activity, Metabolic Equivalents (METs) are used. This is a convenient and standard method (Ainsworth et al., 2000; WHO, 2017). MET is the ratio of an individual's working metabolic rate, related to a standard resting metabolic rate. One MET is defined as the energy that is consumed while sitting (considered a resting metabolic rate), which is equivalent to a caloric consumption of 1kcal/kg/hour (Ainsworth et al., 2000; WHO, 2017). Therefore, different levels of PA intensity (i.e. Sedentary, light, moderate, and vigorous) are defined based on METS as following:

Sedentary: Activities with very low energy expenditure of approximately 1.0–1.5 METS are defined as sedentary activities, which include sitting and lying down (Scholes, 2016; Tremblay et al, 2017)). Watching television, using a computer, video games, motorised transport, reading, talking, or listening to music are examples of sedentary activities

Light: Activities ranging between 1.5–3.0 METS are considered as light intensity activities (Ainsworth et al., 2000; Schaefer, Nigg, Hill, Brink, & Browning, 2014). Walking slowly (i.e. shopping or walking around the office), making the bed, eating, preparing food, and washing dishes are examples of light activities.

Moderate: Activities ranging between 3.0–6.0 METS are classified as moderate intensity activities. Compared to light activity, these activities require more oxygen consumption. Moderate intensity activities are described as the activities that require a moderate amount of effort, which makes the participant warmer, breathe harder, or accelerates their heartbeat and makes them sweat, yet the person is still able to talk. Some examples of moderate physical activities are: sweeping the floor, walking briskly, slow dancing, cycling, or playground activities.

Vigorous: Activities with ≥ 6.0 METS are classified as vigorous intensity activities. To complete a vigorous activity, the highest amount of oxygen consumption is required. These activities increase the heart rate and make breathing fast, which makes conversation much harder. Running, swimming, football, soccer, and jumping rope, are examples of vigorous physical activities (Ainsworth et al., 2000; WHO, 2017).

In addition to measuring the four variables of physical activity (frequency, intensity, time, and type), a reliable and valid measure should be able to evaluate the prevalence of recommended guidelines for an individual, examine the impact of different intensity levels on an individual's health, make cross-cultural comparisons feasible, and finally examine the impact of different interventions (Helmerhorst et al., 2012).

4.8 PA assessment

There are a variety of techniques available for measuring PA, including direct observation, self-report, interviews, proxy-reports, diaries, heart rate monitoring, pedometers, and accelerometers (Bai, 2012; Sirard & Pate, 2001). The methods, generally, can be either through subjective measurement (questionnaire-based surveys) or through objective measurement (Cavill & Rolfe, 2006; NHS, 2009). Some of the commonly used methods in school and home settings will be discussed below.

4.8.1 Subjective measurements

Subjective measurements of PA include: Direct observation, Self-report, Proxy-report, Diary, and Interview (Cavill & Rolfe, 2006; NHS, 2009). Self-administered reports are a type of measurement that is widely used as it is easy to administer, cost effective, and empowers researchers to collect a substantial amount of data (Bai, 2012; Sallis, 1991). Using this method, participants are asked to report their PA patterns over a given period of time (most often 24 hours, and seven day recall). One limitation of self-report questionnaires is that data can be influenced by human error as reports depend on the person's judgment and ability to recall the frequency, intensity, and duration of their activity (Bassett & John, 2013). To ensure that children don't have to rely on their recall, questionnaires have been validated and redesigned to be suitable for children.

Questionnaires can provide examples of different types of sporting and leisure time activities, in order to help children to remember the activities they participated in (PAQ-C: Crocker et al., 1997; CLASS: Telford et al., 2004). Most existing children's PA questionnaires are limited to only assess two or three of the four PA dimensions (Telford et al., 2004).

In order to overcome this limitation, the CLASS questionnaire was developed for children 10-12 years old, by Telford, et al. (2004). This questionnaire assesses type, frequency, intensity, and time of the PA, along with sedentary activities, throughout school and leisure time, over the course of a week. To examine the validity and reliability of the CLASS, results of the questionnaire were compared with MVPA and energy expenditure data, which were derived from an accelerometer used over the course of a typical week (Telford et al. 2004).

Diaries are also a form of self-report measure that often are used to collect information on children's PA patterns. The most effective method for diary data collection is to code the PAs throughout the day on a diary form used by participants (Bai, 2012; Sallis, 1991). However, the use of diaries may not be effective for young children, as they may feel uncomfortable carrying a diary around and recording data all the time.

Another type of subjective measurement of PA is the interview-scale, which is similar to the self-report. The main difference between them is that the administration is performed by a trained interviewer. The interviewer asks about the participant's physical activity in different periods (morning, afternoon, and evening) and only records the activities that were sustained for 5 minutes or more (Bai, 2012; Sallis, 1991). For assessing PA in large sample sizes interviews are not recommended as they are time consuming (Ridgers et al., 2012).

Proxy-report questionnaire is another method while a parent or teacher records the child's amount, time, and type of PA (Sallis, 1991). By using this method, recall errors that are caused by children's cognitive limitations can be minimized. Proxy reports appear promising and would be suitable for large study populations, if a reliable instrument can be developed (Sirard & Pate, 2001). The CLASS proxy-report of children's PA is identical to the self-report measurement (Telford et al., 2004).

4.8.2 Objective measurement

These measurements include: Heart rate and Motion sensors (Pedometers and Accelerometers), which became widely popular for objective measurement of physical activity (Pagels, Boldemann, & Raustorp, 2011; Sirard & Pate, 2001). These measurements, compared to self-report, diary, proxy report, and interview, are less effected by the subjectivity inherent in participant reports and are independent from recall ability and judgments of participants (Bassett & John, 2013; Sirard & Pate, 2001). They can also be used in large samples size.

4.8.2.1 Heart rate monitoring

Heart rate monitoring can be used to create different categories of PA, such as very active, somewhat active, or sedentary. However, this method is unable to specifically estimate an individual's PA, as the results are affected by psychological and environmental stressors (Sirard & Pate, 2001).

4.8.2.2 Pedometers

Pedometers are relatively, cheap, simple, and easy to use electronic devices that can be used to estimate the mileage walked or the steps taken over an observational period (McNamara, Hudson, & Taylor, 2010;

Pagels et al., 2011). Typically, they measure the steps by using a spring-suspended mechanical lever that moves up and down, in response to vertical displacement. Each movement is recorded and usually displayed digitally (McNamara, Hudson, & Taylor, 2010; Pagels et al., 2011). The use of pedometers, as a measure of PA, in children has been widely validated across the literature (Clemes & Biddle, 2013; McNamara et al., 2010).

This method, however, has its own limitations. For example, adherence to some types of pedometers (hip mounted type), especially in children, is an issue. More importantly, pedometers are unable to assess the information on intensity and pattern of the performed activities or to measure the SB (Bassett & John, 2013; McNamaraet al., 2010; Pagels et al., 2011). Also, they are not waterproof and do not measure non-ambulatory movements.

4.8.2.3 Accelerometers

Accelerometers are sophisticated electronic devices that are designed to measure the accelerations produced by movement of the body (Pagels et al., 2011; Sirard & Pate, 2001). They measure movements in different dimensions and provide accurate objective data for PA variables (intensity, duration, and frequency) (Hnatiuk et al. 2012; Oliver et al. 2007). Unlike pedometers, accelerometers can differentiate between different intensities of PA and estimate the amount of time that is spent on sedentary, light, moderate, vigorous, or MVPA (Pagels et al., 2011; Sirard & Pate, 2001).

Accelerometers measure accelerations of the body segment from the place where they are attached (Migueles et al., 2017). In order to obtain movement/accelerations data (i.e. activity counts), the signal is usually filtered and pre-processed by the monitor. Epoch lengths are used to measure the activity level (Migueles et al., 2017; McClain, Abraham, Brusseau, & Tudor-Locke, 2008; Pagels et al., 2011). An epoch is considered as the amount of time (i.e. seconds that range from 1-60) during which, the activity counts are recorded, for processing and analysis. Considering the optimum cut-off points (thresholds for classification of PA intensities) for the observed age group, the recorded activity counts in each epoch can be categorized into a PA intensity category (sedentary, light, moderate, or vigorous). In addition, by applying algorithms to the activity counts estimation of PA energy expenditure (PAEE) or sleep-related behaviours is possible (Migueles et al., 2017).

Accelerometers are widely used to assess PA of adults and children (Cain, Sallis, Conway, Van Dyck, & Calhoon 2013; Fairclough et al., 2016; Sirard & Pate, 2001). In the UK, large surveys such as the Health Survey for England (HSE), are using these devices to objectively measure the PA at the population level (Rowlands et al., 2014). Currently, a range of accelerometers are commercially available. They vary with regard to the placement (e.g. hip, low back, or ankle), battery lifetime, memory storage and technical differences such as type of sensors used, dynamic ranges, reference voltage, filtering processes etc. (Fairclough et al., 2015; Schaefer et al., 2014). In a systematic review by Migueles et al. (2017) accelerometer methods are categorised into two groups: 1) data collection protocols including decisions on device placement or sampling frequency, and 2) data processing criteria including filters, epoch length, non-wear-time definition, cut-points, and algorithms. Thus depending on these factors the outcomes differ.

Accelerometers were primarily designed to be worn, on the hip to be near to the gravity centre of body and to be able to reflect the whole body's movement and energy expenditure (Rowlands et al., 2014). However, a limitation of hip wearing is that adherence can be very poor particularly for children, which leads to selection bias and misclassification (Migueles et al., 2017; Rowlands et al., 2014). Recently, body locations such as the wrist have replaced the hip for accelerometer placement (Crouter , Flynn, & Bassett, 2015; Fairclough et al., 2015; Migueles et al., 2017). The wrist location increases wear time compliance and enables the researcher to assess sleep time. Higher compliance leads to assessment of more days and more reliable measurements of activity especially among children (Rowlands et al., 2014; Fairclough et al., 2015; Migueles et al., 2017).

The GENEActiv accelerometer is one of the most recent and advanced types of accelerometers (Roscoe, James, & Duncan, 2017). It is a light-weight (16 g), small (L 36mm, W 30mm, H 12mm), and triaxial device that collects the data in three different axes (vertical, anteroposterior, and mediolateral), with a rate of up to 100 Hz, storage capability of 0.5 GB, and data collection up to seven days. Data is downloaded using a USB 2.0 charging cradle. These accelerometers are designed to be worn on the wrist and are waterproof, which enables them to be worn 24 hours a day. The GENEActiv has demonstrated a high criterion and concurrentvalidity, regardless of whether it is worn on the right or left wrist; right: $r = .90$; left: $r = .91$, both $p < 0.01$, and right: $r = .83$; left: $r = .85$; both $p < 0.01$ respectively for criterion and concurrent validity (Phillips, Parfitt & Rowlands, 2013). A near-body temperature sensor confirms wear time, and an accurate and configurable clock allows data to match the reported activity or other measurements. GENEAactiv accelerometers measure sedentary, light, moderate, and vigorous intensity activities thus, MVPA can be distinguished (Phillips et al., 2013). Therefore, considering the advantages of GENEActiv accelerometers which is validated and suitable for measuring children's PA (Phillips et al., 2013; Schaefer et al., 2014), it will be used in the studies in this thesis.

4.9 SB Assessment

Similar to PA assessment, SB can be assessed subjectively and objectively through various methods such as: self /proxy reports, diary, direct observation, heart rate monitoring, metabolic unit, calorimeters, and accelerometers (Grewal, 2013; Lubans et al., 2008). Questionnaires, either self or proxy-report, assess sedentary time by asking the duration of screen related (e.g. watching TV or playing video games) or non-screen related SB (e.g. reading and writing). Accelerometers, on the other hand, calculate sedentary times when movement is not present and provide a total amount of SB in all domains, including sitting, reading, TV watching, and other screen related SB (Grewal, 2013; Lubans et al., 2008).

Therefore, since accelerometers as stated earlier, are able to more accurately assess children's PA intensities including SB, the GENEAactiv accelerometer which is the most advanced one with better outcomes compared to other brands (Fairclough et al., 2015) will be used in this thesis.

4.10 PA and SB perception

Various question-based methods for PA assessment, such as self-report, proxy-report, diary, and interviews, are used to assess parents' and children's perceptions of the child's PA (Chiang et al., 2009; Corder et al., 2010;2012; Grewal, 2013; Hesketh et al., 2013; Jaballas et al., 2011). The same methods have been used by researchers to assess parents' and children's perceptions of SB (Colley et al., 2012; Dory et al., 2009; Grewal, 2013; Jaballas et al., 2011; Robinson, Winiewicz, Fuerch, Roemmich, & Epstein, 2006). Among these methods, self and proxy-reports are the widely used methods for assessing children's and parents' perceptions of PA and SB of the child.

As accelerometers will be used in the current study, which provide four different intensities (sedentary, light, moderate, and vigorous) to assess actual PA and SB, a self or proxy-report questionnaire will be used to assess perceptions as it provides these variables and makes the direct comparison of data applicable.

To examine parents' and children's perception of PA and SB, various proxy/self-report questionnaires (e.g. PAQ-C,1997) have been used by some researchers (Corder et al., 2010; 2012; Greca et al., 2016; Grewal, 2013; Hesketh et al., 2013), however they are not suitable to be used in this study. Their main limitation is that they are not concurrent with the results from accelerometers that provide more details (e.g intensity of PA).

One questionnaire that can provide these details, is the CLASS questionnaire by Telford et al. (2004). This questionnaire assesses PA levels of children by asking about the type of activity, duration, and frequency. It also assesses SB by asking about the time spent on a variety of sedentary activities, during a week (Telford et al., 2004). The provided data for PA and SB are in accordance with the data from accelerometers which makes direct comparison possible. In addition, the identical feature of self and proxy–report of the CLASS makes it suitable for using in this research, since the aim of this research is to examine both parents' and children's perceptions of child PA and SB levels.

In China, a modified version of the CLASS questionnaire was utilised in a study of 84 boys and 136 girls aged 9–12 years (Huang, Wong, & Salmon, 2009b). Validity of this modified version was determined by comparing the data with estimated values from accelerometers. The results suggested that the questionnaire provided reliable and valid estimates in overall PA patterns in Hong Kong/ Chinese children. The questionnaire has also been validated to be used among African children (Tian, Du, & Toriola, 2014).

Therefore considering the advantages of CLASS questionnaire (provide data on PA intensities including MVPA and SB which makes direct comparison possible, identical self and proxy report, reduced recall biased, etc.) it will be used for the purpose of this research.

Fundamental movement skills (FMS) assessment

There are two assessment approaches available for measuring Fundamental Movement Skills (FMS) of children: objective and subjective approaches (Eddy et al., 2020; Hands, 2002; Logan, Barnett, Goodway, & Stodden, 2017). The objective measurements are norm-referenced (product-oriented) measurements that objectively measure the product or outcome of the performed skills (e.g. measuring speed of a child or distance a child can throw) and concentrate on maturity of a child. The subjective measurements are criterion-referenced approaches (process-oriented), which assess the technique of performed skills.

There are various FMS assessment tools based on these two approaches (Eddy et al., 2020). The Movement Assessment Battery for Children (MABC, Henderson & Sugden, 1992) is a commonly used product-oriented tool. One limitation regarding objective measurements is that they do not provide direct information on the proficiency of the performance and; thus, are unable to evaluate the intervention or teaching program (Branta, Haubenstricker, & Seefeldt, 1984; Hands, 2002). On the other hand, subjective measurements, are primarily based on a 'mastery' or 'proficiency criteria' model (Zuvela et al., 2011). This model describes the key actions of the main body parts for performing a proficient action, instead of patterns that can be observed during FMS measurement. The assessor records the key components of the skill that are demonstrated by the performer. For example, in running it asks: "are the arms moving in opposition to the legs?", "is the head stable?", or "are the knees lifting high?"

In recent years, research has focused on the subjective measurement, which concentrates on the form (technique) of the movement. The reason why most of the researchers, predominantly, measure the technique of the skill is because this will allow them to identify the developmental stage of the child, which is very important (Haywood et al., 2012). Therefore, the provided information (on children's motor competence) through subjective measurements, can be useful for informing and planning developmental intervention programs (Rey et al., 2020).

There are numerous criterion-referenced instruments available to assess FMS of children which vary based on the complexity of skills, number of skills and criteria for each skill or whether the observation is recorded and scored live or through video analysis (Hands, 2002; Logan et al., 2017). Some examples are; Children's Motor Skills Protocol (CMSP, William et al., 2009) , Ohio State University Scale for intra-Gross Motor Assessment (OSU-SIGMA, Loovis & Ersing , 1979) and TGMD (Ulrich & Sanford, 1984) (Eddy et al., 2020). One of the most common applied test is the TGMD which is designed for measuring motor development of children aged 3-10 years (Rey et al., 2020). The TGMD and its variances; (Test of Gross Motor Development second edition; TGMD-2, Ulrich, 2000a) and (Test of Gross Motor Development third edition; TGMD-3, Ulrich, 2016), are norm and criterion referenced tests that emphasizes a process-oriented approach for assessing fundamental movements (Bouquet, 2016; Rey et al., 2020).

In order to improve the reliability of the original TGMD test, TGMD-2 (Ulrich, 2000b) was developed. The TGMD-2 assesses 12 gross motor skills, which are divided into two sub-categories: "locomotor" and "object-control". Locomotor skills include run, leap, horizontal jump, slides, gallop and hop, and object-control skills include throw, catch, kick, dribble, roll and strike skills. Skills are comprised of three-five observable criteria and children will be given a score of 1 (if the child correctly performs a criterion) or 0 (if the child fails to correctly perform the skill criterion or in absence of each criterion). The sum of the component scores provides the raw scores for that skill. The raw scores of the skills in each sub-category are then aggregated to provide scores for object-control skill or locomotor skill. The sub- categories' scores are then summed to provide the total score of FMS (Ulrich & Sanford, 1984; Ulrich, 2000a).

The TGMD-3 (Ulrich, 2016) has slight differences with the TGMD02 as follows: "object control" sub-category is renamed to "ball skills", one more skill is added to this sub-category and some skills have been changed. In regard with skills, leap and underhand roll skills has been removed while skip, one-handed forehand strike, and underhand throw has been added. Thus in total TGMD-3 assesses 13 skills of children (Ulrich, 2016).

The TGMD tests are shown to have high validity and reliability in various aspects compared to other FMS measurement tools (Eddy et al., 2020;

Rey et al., 2020). They are found to be appropriate tool to be used in different populations and for different ethnicities/cultures (Rey et al., 2020). Overall, studies across the world including UK and Iran, show TGMD tests (mainly TGMD-2) have moderate-to-excellent internal consistency and test-retest reliability, and good-to-excellent both interrater and intra-rater reliability (Eddy et al., 2020; Rey et al., 2020).

The results of TGMD tests are used for various purposes such as; to identify children with poor gross motor development, designing intervention programs, evaluate the efficacy of development programs, and examine children's progress and to be used as an assessment tool in research (Bouquet, 2016; Rey et al., 2020). Thus TGMD tests have been widely used in different situations such as education, clinical and research setting.

Therefore, considering the advantages of TGMD tests including its cultural appropriateness, in this research, the TGMD-2 (which is widely used in literature and studies across the world) will be applied to assess children's FMS proficiency in both countries.

4.11 Perceived physical competence/children's perception of FMS

A questionnaire is a frequently used method for assessing children's/parents' perceived competence/FMS. Interviewing is another method, however, it is rarely applied as interviews are time consuming (especially in large sample sizes) (Ridgers et al., 2012). Therefore, this study chose to use a questionnaire.

Concerning children, some researchers (like Poulsen et al. 2011) have used the Self-Description Questionnaire-II (SDQII; Marsh, 1992), which measures the preadolescent's self-concept. The SDQII is a multidimensional measure with 11 subscales that consist of 76 items, scored on a 5-points Likert scale of true-false. Reliability of the questionnaire is high (alpha coefficients between 0.8 and 0.9) and it has been validated by Byrne et al. (1996). However, the questionnaire focuses on various dimensions of self-perception, such as physical appearance, peer relations, reading, mathematics, and global perception, which are not related to this research. It also requires a long time to respond to all the questions which could be tedious and time consuming for children, especially those with a short attention span. Another questionnaire that is widely used in the literature is Harter's (1985) Self-perception Profile for Children (SPPC). It is geared to those aged 8-15 years. This measurement has been excessively used in research of this nature and has shown a good reliability (internal consistency and test–retest stability), and validity (Muris et al., 2003). This scale measures self-perceptions in six domains: athletic, scholastic, physical appearance, social acceptance, behavioural conduct, and global self-worth. The Athletic competence sub-scale of the SPPC has six questions, which can be used to assess children's self-perception of their physical competence. This particular sub-scale refers to children's ability to perform well at sports and outdoor games which show their athletic power (Harter, 1985).

The unique scoring system of Harter's questionnaire has made it very popular, among researchers. The questionnaire consists of two contrasting groups of statements and the child should decide which kind of "kid" was most like them. One example is "*Some kids feel that they are better than others their age at sports BUT other kids don't feel that they can play as well*". Then they need to indicate to what extent the chosen option is true as two choices are available for each statement: 'really true for me' or 'sort of true for me'. As the response options don't have negative words and are extended to four options, compared to the common two-options of "true" or "false", it is more likely that the children give honest answers and avoid socially desirable answers (Duncan & Duncan, 1991; Harter, 1985; Horn & Hasbrook, 1987; Kimiecik et al., 1996). Due to the advantages discussed here, this questionnaire will be used in this research.

For assessing parents' perceived physical competence of their children, various questionnaires have been used by researchers (Boise et al., 2004; Jones et al., 2010). For example, Boise et al. (2005) have adopted two questions from Jacobs & Eccles' (1992) questionnaire, which was designed to measure mothers' perceptions of their child's social, maths, and sports ability. These two questions, related to sports ability, are as follows: "In general, how good is your child in sports?" and "How well is your child doing in sports, this year?". Scoring was based on a 7 point Likert scale. Although, a good reliability is reported and the questionnaire has been validated (Bois et al., 2002; Sarrazin et al., 2000b), the two questions are very general and not suitable for this research.

Jones et al. (2010) used a revised version of the Developmental Co-ordination Disorder Questionnaire (DCDQ), which consists of 15 items and is appropriate for parents of children 5-14 years old (Wilson et., 2000; 2009). As this questionnaire has been developed to assess co-ordination disorder in children, there are several items that are not relevant to FMS skills and sport abilities of children. For example: "Your child is quick and competent in tidying up, putting on shoes, tying shoes, dressing, etc." Therefore, it is not appropriate to be used in this research, due to having unrelated questions, besides good psychometric qualities (Wilson et al., 2000; 2009).

Harter (1985) developed and validated the teacher rating scale (TRS) for children 8-15 years old, parallel to the SPPC. Similar to the SPPC scale, the TRS consisted of different sub-scales (five sub-scales). Each sub-scale consisted of three questions and the questions can be reworded to be used by adults other than teachers (including parents), as recommended by Harter (1985). In order to assess teachers'/parents' perceived physical competence, the athletic subscale can be used. The items in this questionnaire are in the same format as the children's questionnaire (i.e. two options of opposite descriptions of a child) with the same scoring system. High reliability has been reported for this questionnaire (ranging from .90 to .94. Weiss and Amorose (2005) used this subscale in their study to assess the physical competence of children, according to their teachers' perception. Therefore, as the SPPC is going to be applied for children's perceived competence in this research, the TRS will also be reworded to be used for assessing parents' perceived competence in this thesis.

In order to improve the reliability of the children's perceived FMS instrument, and to provide a measurement that is specifically related to the actual tested skills by the TGMD-2, Southall et al., (2004) modified Harter's athletic competence sub-scale by adding 12 items (measured by the TGMD-2) with the same format (Jones et al, 2010; Southall et al., 2004).

Similarly, as in the current thesis, TGMD-2 will be used to measure FMS skills of children, in order to improve the reliability of the measurement for assessing children's perceived FMS in this thesis and make it relevant to the actual skills, the previously described version of Harter's scale that is modified by Southall et al. (2004), which consists of 18 questions is used (Jonse et al., 2010; Southall et al., 2004). Likewise, for improving reliability of parents perceived competence tool, in this thesis, the 12 items of TGMD-2 will be added to the 3 reworded items of the parents' questionnaire (athletic subscale of TRS), bringing it to 15 items. More details of these measures are available in the next chapter.

4.12 Qualitative Methodology

Qualitative studies can provide contextual information and rich insight into human behaviour (Guba & Lincoln 1994; Roscoe et al., 2017) through exploring peoples' values, perceptions, and attitudes in relation to a topic (Jago et al., 2012; Mackintosh, Knowles, Ridgers, & Fairclough, 2011). Although it is likely that qualitative studies may enhance the understanding of the studied topic, a quantitative approach has been predominantly adopted in health-related research (Jones et al., 2009). For instance, limited studies are available on various aspects of CO including attitude towards weight, exercise and health behaviours of children, perceived barriers, parents' experience etc. (Staniford et al., 2011). Thus, for improving understanding of the issue as well as informing intervention programs, conducting in-depth qualitative studies with parents is suggested (Jago et al. 2012; Oude Luttikhuis et al., 2009; Staniford et al., 2011). The insights of qualitative studies might be beneficial for practitioners who are working on designing and improving the efficacy of intervention programs aiming to reduce and prevent CO (Jones et al., 2009; 2011; Eli et al., 2014). In addition, it is proposed that the use of qualitative research methods increases understanding of different cultures and communities which is important for improving the contextual frameworks that are needed for future research on those cultures and appropriate intervention programs (Mejia de Grubb et al., 2016; Pulakka et al., 2015). Therefore, as the present research is cross-cultural and due to the lack of in-depth research on this topic, the use of qualitative methods to explore parents' perception of the child's weight status, PA, SB and FMS may enhance our understanding of the topic.

Qualitative data can be obtained in different ways including interviews, focus groups, case studies and participant/non-participant observations (Pope& Mays, 2000). Focus groups and interviews are the most popular methods in order to collect qualitative data (Kairuz, Crump & O'Brien, 2007). Interviews are often used in health care and are very helpful in order to gain meaning that individuals give to health and its associated factors (Baum 1995; Britten, 2000). Focus groups are mainly used when there are small groups of participants and they are used to explore perceptions, thoughts and impressions regarding a specific topic of investigation (Kairuz et al., 2007). On the other hand, in depth interviews, besides providing a participant's perspective on the research topic, can elicit their personal feelings, opinions, and experiences, as well as exploring the way people interpret and order the world. In addition, with focus groups it is likely that some individuals will feel less able to express themselves and may follow other people's opinions, while in interviews people may be more relaxed and comfortable to express their opinion on the research topic (Kairuz et al., 2007).

Due to obesity being a potentially sensitive and stigmatising topic, which people may feel more comfortable discussing alone than in a group, as well as practical difficulties in getting a group of people together at one time, interviews seemed to be more applicable than focus groups in this study. Thus, although some researchers have used other methods such as focus groups to examine parents' perceptions of weight (Jones et al., 2011), SB (He et al., 2005), PA (Pulakka et al., 2014) and FMS (Roscoe et al., 2017), due to the drawbacks of focus groups discussed above, interviews were selected for this study.

There are three types of research interviews: structured, semi-structured and unstructured (Gill, Stewart, Treasure, & Chadwick, 2008). Semi-structured interviews consist of some main, key questions which are asked from all participants. This helps to define areas which need to be explored (which is an advantage compared to unstructured) as well as allowing the interviewer to be able to further explore areas which need more developing (which is an advantage compared to structured). Semi-structured interviews are mostly used in healthcare as it provides participants some guidance on what to speak about (Gill, et al., 2008). Thus, for the purpose of this study semi-structured interviews are used.

This qualitative study will be reported in chapter six as the next chapter will cover the quantitative research which comprises three linked studies.

Chapter five

Quantitative studies (study 1-3)

British and Iranian Parents' and children's awareness of the child's weight status, physical activity (PA), sedentary behaviors (SB), and fundamental movement skills (FMS).

5.1 Abstract

Objectives: To examine parents' and children's awareness/accuracy of their perception of the child's weight status, Physical Activity (PA), Sedentary Behavior (SB) and fundamental movement skills (FMS). Overweight and normal weight children were compared. British and Iranian parents and children were examined in studies 1 and 2 respectively and then compared in study 3.

Methods: A total of 233 children (aged 8-10 years) and their parents (100 British and 133 Iranian) were recruited from schools in the two countries. After underweight children were removed, the results from 98 British children (57 girls and 41 boys) and 119 Iranian children (55 girls and 64 boys) as well as their parents (British; 83 mothers, 15 fathers; Iranian; 93 mothers, 26 fathers) were analysed. Body mass index (BMI) percentile was measured to assess actual weight status and children were categorised as normal weight (N=71 British & 74 Iranian, if BMI <85th percentile) and

overweight (N=27 British & 45 Iranian, if BMI ≥85th percentile). FMS (Test of Gross Motor Development–2) and actual PA and SB (GeneActive accelerometers) were measured. Weight perception was assessed visually (figure drawings) and verbally (questionnaire). FMS and perceived physical competence (PA & SB) were assessed using validated questionnaires for parents and children.

Results: In both countries overweight children had significantly higher SB and lower FMS compared to their normal weight counterparts. Overweight Iranian children had significantly lower Moderate-Vigorous PA (MVPA) levels compared to normal weight children but there was no difference between the weight groups in UK children. British children had higher PA and SB than Iranian children but no difference was found between the two countries on FMS level of children. Using both verbal and visual tools in both countries, many overweight children (85.2% & 54.5% British; 51% & 28.9% Iranian verbally & visually) and their parents (81.5% & 50% British; 46.7% & 22.2% Iranian verbally & visually) significantly understimated the child's weight status. Comparing the accuracy of children's and parents' weight perceptions in the two countries, significant differences were found only for the overweight group with more accuracy for Iranian participants. Iranian parents and children as well as British children significantly overestimated the child's MVPA while British parents were accurate. When the two countries were directly compared, there were significant differences in PA awareness of parents and children for both weight groups, with Iranian participants overestimating PA more than British. British parents and children as well as normal weight Iranian children significantly underestimated the SB of the child, whereas overweight Iranian children were accurate and all Iranian parents significantly overestimated SB of their children. Comparing SB accuracy levels in the two countries, significant differences were found for all parents as well as overweight children. In addition, concerning FMS perception, in both countries, there was a significant correlation between parents' perceived competence and child's actual FMS for normal weight but not for overweight children. Furtheremore, no correlation was found between children's reports of perceived competence and their actual FMS for both weight groups in the two countries. Thus everyone, except parents of normal weight children, was unaware of FMS. When the results of FMS in the two countries were directly compared, the only significant difference was regarding overweight children; with British overweight children having more overestimation than overweight Iranian children.

Conclusion: Between and within the two countries some discrepancy in parents' and children's awareness of the child's weight status, PA, SB and FMS were identified, which have been linked to health risks in later life. As parents are considered agents of change and their awareness/accurate perception of weight status and health behaviours of their children impacts children's health behaviours as well as children's self-awareness, examining underlying factors affecting their un/awareness is essential. Thus there is a need for a qualitative study to explore the mechanisms that underpin these inaccuracies among parents in both countries. Results might be beneficial for improving future international prevention strategies with parents and children.

5.2 Introduction

Prevalence of Child hood obesity (CO) has increased dramatically at an alarming rate in developed and developing countries (WHO, 2016; 2018). Considering the increasing trend of CO worldwide, along with its associated health consequences and its tracking into adulthood, prevention of this life-threatening global issue among children has high priority across the world (PHE, 2015; WHO, 2018). Although a wide range of international studies have been conducted to examine obesity in children, the vast majority are from developed countries (Kelishadi et al., 2014; Khashayar et. al., 2018). However, two-thirds of the world's population is living in developing countries where the risk factors and perceived causes of obesity vary from those in developed countries, and cultural and societal values might have an impact (Renzaho & Mellor, 2010; WHO, 2000). Thus, conducting cross-cultural studies can be beneficial as comparisons may reveal potential differences, as well as similarities, between two different cultures, which may help inform intervention programs to tackle CO (Renzaho & Mellor, 2010). Therefore, considering the need for tackling the high rate of CO in UK (over 30%) as a developed country and Iran (nearly 21%) as a developing country (Baker, 2021; MEDU, 2021), the current study is a cross-cultural study conducted in these two countries.

As discussed in previous chapters, parents' and children's awareness/accurate perception of weight status of the child is critical for changing children's behaviours and hence tackling CO (Howard, 2007; Jaballas et al., 2011; McKee et al., 2016; White et al., 2016). However, according to research, the majority of overweight/obese children and their parents are unaware of the child's weight problem and underestimate the weight status of the child (Cai et al, 2017; Lundahl et al., 2014; Manios, et al, 2015; Maximova et al., 2011; Parkinson et al, 2017; Shiely et al., 2017). Various degrees of parents' misperception/awareness of their child's weight have been reported worldwide; from 50.7% to 78.4% in Europe and the US and from 29.7% to 89.2% in Asia. (Lundahl et al., 2014; Park, 2017; Rietmeijer – Mentink et al., 2013). The UK is reported to have a high degree of parents' weight misperception among European countries (Hochdorn et al., 2018). Results of a health survey in England (2015) showed that 91% of mothers and 80% of fathers of overweight children and 48% of mothers and 43% of fathers of obese children underestimated their child's weight (Fuller et al., 2016; NHS Digital, 2018b). Similarly, this survey's results showed that the majority of overweight and obese children underestimated their own weight status. In Iran, the results of very limited studies show that Iranian parents misperceive the weight status of their overweight children (Akbari et. al., 2006; Pakpour et. al., 2011; Sarrafzadegan et. al., 2013). However, the reported misperception rate varies in these studies (for example, 35% and 23.3% respectively in studies by Sarrafzadegan et al., 2013, Pakpour et al., 2011, Akbari et al., 2006) which might be related to different age ranges of samples in these studies as well as different methodologies they used. Iranian children have also been found to misperceive their own weight in two major studies by Kelishadi et al., (2015) and Angoorani et al (2017). They found that 40% (Kelishadi et al.) and 61.8% (Angoori et al.) of overweight participants misperceived their weight status. The discrepancy in rates of misperception in these two studies might be related to differences in the age range of the samples in these two studies (aged 8-10 years vs 7-18 years). As older children have more accurate perception than younger children (Cai et al., 2017; Manios et al., 2015), separately examining children and adolescents' self-weight perception might provide different results.

Studies show that worldwide SB of children has increased and the majority of children have low levels of PA and FMS (Aubert et al., 2018; Bolger et al., 2020; Hardy et al., 2007; Robinson, 2011). In this light, parents' and children's accurate perception of SB, PA and FMS of children are considered important for reducing SB and promoting PA and FMS of children which can also help children to maintain a healthy weight, hence prevent CO (Corder et al., 2010; Grewal, 2013; Liong et al, 2015; Weiss & Amorose, 2005; Stodden et. al., 2016; Utesch, et al., 2018). However limited studies show that the majority of parents and children are not aware of the child's PA, SB (Adamo, 2009; Corder at al., 2010, Corder et al., 2012; Grewal, 2013; Small et al., 2013) and FMS level (Clark et al., 2018; Liong et al, 2015). Corder et al. (2010), in their study with British children aged 9-10 years, found that the majority (80%) of parents of inactive children (having less than 60 minutes daily MVPA) and 66% of inactive children themselves, are not aware of the child's PA and tend to overestimate it. There is no data on parents' and children's awareness of the child's SB in the UK. Regarding FMS, Clark et al. (2018) found British children are not aware of their FMS level, however the weight status of children was not considered in their study, and no study is available on parents' awareness of FMS of their children in UK. In addition, regarding PA, SB and FMS, no study in Iran has examined whether parents or children are able to accurately perceive the child's PA, SB and FMS.

Therefore, given the differences in the accuracy/awareness of weight perceptions as well as the lack of studies on SB, PA and FMS awareness across the two countries, along with the methodological limitations in the literature (discussed in chapter 3) the purpose of the quantitative studies was to examine both within and between-country differences in the actual weight status, PA, SB and FMS levels of children (aged 8-10 years), as well as parents' and children's awareness of the child's weight status, PA, SB and FMS levels (i.e. the difference between perceived and actual). Overweight and normal weight children were compared. Results might be beneficial for informing interventions aiming to improve parents' perceptions of their child's weight problem, PA, SB and FMS, and hence may help promote designing beneficial interventions. Comparing countries with different cultures, enables the examination of the extent to which parents' and children's awareness of weight status, PA, SB and FMS is universal or may be culture specific. Therefore, results could be useful for future studies aiming to improve CO management intervention programs worldwide, which in turn may increase efficacy of these programs.

Two studies were conducted; one in the UK and one in Iran, following by a third study in which comparisions of the results of studies 1 and 2 were made.

Study 1: Examines British parents' and children's awareness (accuracy of perception) of the child's weight status, PA, SB and FMS in normal weight and overweight children.

Study 2: Examines Iranian parents' and children's awareness of the child's weight status, PA, SB and FMS in normal weight and overweight children.

Study 3: Compares UK and Iranian parents' and children's awareness of the child's weight status, PA, SB and FMS levels in both normal weight and overweight children.

5.3 Study 1: British parents' and children's awareness of weight status, PA, SB and FMS of the child.

The present study aims to examine: British parents' and children's awareness/accuracy of their perception of their child's weight status, PA, SB and FMS in normal and overweight children.

The Objectives of the study are to examine:

1) Actual PA, SB and FMS levels of British normal weight and overweight children aged 8-10 years.

2) The extent to which British parents and children (aged 8-10 years) are aware of the child's weight status, PA, SB and FMS in normal weight and overweight children.

5.3.1 Questions

1) Are there significant differences in actual PA, SB and FMS levels between normal weight and overweight children?

2) Are parents of normal weight and overweight children aware/accurate in their perception of the child's weight status, PA, SB and FMS level?

3) Are normal weight and overweight children aware/accurate in their perception of their weight status, PA, SB and FMS level?

5.3.2 Methodology

5.3.2.1 Participants

Signed informed consent was gained for 100 children (mean age 9.5±0.6 years; 57 girls and 43 boys) and their parents (mean age 40±4.5years; 85 mothers, 15 fathers) to participate. The majority of the parents were White (72.2%) with the remaining parents of Mixed (5.1%), Asian (11.3%), Black (6.2%) and other (5.2%) ethnicities. Of the parents, 62.9% had university or higher education and 82.4% were married or living as married. Children were recruited from six schools in one London Borough. Participants were from middle SES and the least deprived area (Department for Communities and Local Government, 2017).

5.3.2.2 Procedures

Following the ethical approval from Middlesex University, London Sport Institute Ethics subcommittee (Appendix A), schools were recruited. All schools in one London borough received a summary of the research by email from the principle investigator and were asked whether they would volunteer to participate in the current research. Six schools replied indicating their willingness to participate. After a meeting with P.E co-ordinators in each primary school, an information pack and consent form (Appendix B) along with questionnaires were sent to schools to distribute to the parents of all children aged 8-10 years (in total 360 packages were sent to schools). Of the parents that received the information pack, 100 parents completed the questionnaires and returned signed informed consent for themselves and on behalf of their children (The package was sent home with children and returned by them to their classroom teacher). Participants were informed that they are free to withdraw from the study at any time without giving any reason and their participation is voluntary.

Following obtaining parental consent with the completed questionnaires, physical data (i.e. mass, height, fat, and FMS skills) were collected and accelerometers were set and put on children's wrists in the school's sports hall at a time established by the school P.E co-ordinator. Prior to the physical data collection children filled out their questionnaires in their classroom with assistance from the teachers and the principle investigator. Data was collected between February 2016 and March 2016.

5.3.2.3 Measures

5.3.2.3.1 Anthropometric measurements

BMI

Children's height and mass were measured using a stadiometer and electronic weighing scales (Seca, Germany, Models: SECA213, SECA877). Children were asked to remove their shoes and were wearing shorts and a t-shirt. This took place in the sports hall prior to a PE session and was completed individually to maintain confidentiality of the children's data. Height and mass were used to calculate BMI, using the following equation: kg/m^2. UK 90 growth reference applied to categorise children's weight (Cole et al., 1990). Children were categorised as follows: normal/healthy weight if BMI percentile is 2nd-85th, overweight if BMI percentile is ≥ 85th and obese if BMI percentile is ≥ 95th (Cole, Bellizzi, Flegal & Dietz, 2000).

BF%

BF% was calculated by the measurement of skinfolds with the use of Harpenden callipers (Baty International, UK). This method of measuring body fatness, to determine weight status, is widely used in children (Lahti-Koski & Gillb, 2004). Measurements were made at the triceps and medial calf sites in each child (Slaughter, et al., 1988). To mark the point on the triceps where the measurement was to be taken, the half-way point was identified between the superior aspect of the radius and acromial landmark. Once this half-way mark was identified with a tape measure, then the midpoint of the triceps was identified using the human eye and the calliper reading was taken (Thompson et al., 2009). To cite the point on the medial calf, the reading was taken at the point of the largest circumference of the gastrocnemius on the medial side of the leg. A tape measure was used to identify this landmark (Thompson et al., 2009). The percentage of body fat for each child was calculated using the Slaughter et al., (1988) skin fold gender-specific equations:

Boys % fat = .735 (triceps + calf) + 1.0

Girls % fat = .610 (triceps + calf) + 5.1

Following the calculation of BF%, children's BF centiles were identified using sex-specific centile curves as a reference for body fat in children (McCarthy et al., 2006). Children were then classified as: normal, overweight and obese (Cole, et al., 2000).

5.3.2.3.2 Children's actual PA and SB

PA was measured objectively using GENEACTIV accelerometers. The GENEA can be used to accurately assess children's PA intensity when worn on the wrist (Phillips et al., 2013). This is a lightweight (16 g), small (L 36mm, W 30mm, H 12mm) accelerometer that collects data in three different axes (vertical, anteroposterior and mediolateral) at a rate of up to 100 Hz. The GENEA has demonstrated high criterion and concurrent validity, regardless of whether it is worn on the right or left wrist (Phillips et al., 2013). It is designed to be worn on the wrist and is waterproof and can be worn 24 hours a day. A near-body temperature sensor confirms wear time, and an accurate and configurable clock allows data to be matched to reported activity or other measures. GENEA accelerometers measure sedentary (<1.5 METs), light (1.5–2.99 METs), moderate (3–5.99 METs) and vigorous (≥6 METs) intensity activities and thus MVPA can be established (Phillips et al., 2013).

The GENEActiv software (Version 1.2) was downloaded, accelerometers were time synchronised with the local time server and the epoch length was set at 100 Hz. Each child's details (height, mass, gender, date of birth, age, preferred hand to wear the watch) were inserted. Accelerometers were set to record data immediately after disconnection from the computer and after that, the accelerometer was set on each child's preferred wrist. Children were provided with verbal and written instruction and were required to wear the watches for seven days during the waking hours including bathing and aquatic activities (as the watches are waterproof). If they were given the accelerometers on Friday, they were asked to return them back to their class teacher on the next Friday. Participants with four or more valid days (including one weekend) were included in the analysis (Borkhoff et al., 2015). To prevent overestimating the sedentary time with sleep time, data of waking hours between 7:00 and 20:00 were analysed. Data were not valid if the aggregate of counts for waking hours was less than 780 (minutes) or all the counts were considered as sedentary based on cut-points. After extracting data from accelerometers, raw data were converted to epoch compressed files with epochs of 60 seconds (Borkhoff et al., 2015). Published cut-points which are specified for children (aged 8-14 years) were used to calculate the time (minutes) spent in different levels of intensity (Phillips et al., 2013). The average minutes of time spent in sedentary, light, moderate, vigorous and MVPA were calculated to be used for further analysis. For the purpose of this study, only MVPA was used for assessing PA level. A diary sheet was provided for children to write details of any activities they had engaged in, just in case they had forgotten to wear the watch or were not allowed to wear it e.g. in martial arts. In this case, the researcher could add those details to the results from the accelerometer. For those children who had returned their diaries and had done some activities while not wearing accelerometers, the intensity category of the named activity was identified according to the information published in the compendium of Physical Activities (Ainsworth, et al., 2000). The duration (in minutes) of doing that activity was added to the related intensity category data (minutes) of the accelerometers.

5.3.2.3.3 Actual FMS/physical competence

The test of Gross Motor Development 2nd edition (TGMD-2) was employed to assess FMS (Ulrich, 2000a). The TGMD–2 is a process-oriented measure for assessing FMS of children of three to ten years old with well-established reliability and validity (Ulrich, 2000a, 2000b). This test consists of 12 items which assess two subtests including locomotor and object control skills. There are six locomotor skills: run, leap, horizontal jump, slides, gallop and hop and six object-control skills: throw, catch, kick, dribble, roll and strike skills. Digital video cameras (Canon, Japan model: Legira HF R48-05) were set to record the children's performance. Children were put in groups of three. Before each test, assessors visually demonstrated the correct techniques for every skill, however children were not told which components were being assessed. Children then performed every skill twice and their performance was recorded. The learning effect of the two trials has been examined in previous research, which has resulted in reliability of the test in terms of its stability over time (Ulrich, 2000b). Each skill consisted of different specific movement criteria. The movement process characteristic was rated as ‘1’ if a participant presented the behaviour and ‘0’ if the behaviour was absent. Each skill was performed twice, therefore, each component had a score out of two. The component scores for each skill were aggregated to provide the final scores for that skill. The raw scores of the six skills were then added together to provide scores for object control skills or locomotor skills (both subtest scores ranged from 0–48). The total score of FMS was also provided by adding the scores of the two subtests (ranging from 0–96). The higher the scores, the better developed the child’s locomotor, object control, and FMS were, while the lower the scores, the weaker the developed skills (Ulrich, 2000a).

5.3.2.3.4 Questionnaires

Demographic questionnaire

A demographic questionnaire was provided for children and their parents. In the proxy-report questionnaire, parents were asked about their sex, age, ethnicity, height, weight, marital status, and education and in addition, they were asked about their child’s name, sex, age, year group and their own relationship to the child in the study (Appendix C). The self-report version of the questionnaire asked children to identify their sex, date of birth, teacher’s name and year group (Appendix D)

Children’s and Parents’ weight perceptions

Visual (image) measurement

The perception of weight was assessed visually by using the Collins’ Child Figure Drawings scale of a body silhouette drawn for preadolescents and adolescents (Collins, 1991). This is a gender specific measure consisting of seven pictures of children, ordered sequentially from very underweight ‘1’ to obese ‘7’ (Collins, 1991). Children were shown the male or female silhouettes and were asked to select the silhouette which they believed was most similar to their actual figure. Figures in this scale are not assigned a BMI range and are not classified according to body mass status, therefore, in order to examine accuracy of parents' and children's perceptions, picture four was considered as the reference (normal weight) and other pictures were classified relative to that (Daraganova, 2014). Thus, the first three figures indicate the underweight perception, the fourth figure indicates the normal weight perception, figure five indicates the overweight perception and finally figures six and seven indicate the obese perception (Daraganova, 2014). Children's perception was considered ''accurate'' if their response/classification was similar to their actual BMI classification and was considered ''inaccurate'' if their response was not similar (either by underestimating or overestimating) to their actual BMI classification (Appendix D).

The same body silhouette chart was shown to the parents to assess their perception of their child's weight status. Similar to children, parents' perception was considered ''accurate'' if their response/classification was similar to their child's actual BMI classification and was considered ''inaccurate'' if their response was not similar (either by underestimating or overestimating) to their child's actual BMI classification (Appendix C).

Verbal (word) measurement

For verbal perception of weight status, a 5-point scale was used: 1) very underweight, 2) underweight, 3) about the right weight, 4) overweight, and 5) very overweight (Almoosawi et al., 2016; Hussin et al., 2011). Parents and children were asked to indicate in which of the given weight categories would they put their child or themselves respectively. Two categories of very underweight and underweight were then considered as underweight. Like the visual instrument, parents' and children's perceived category was compared with the child's actual weight category to examine how accurate they perceived the child's weight status (Appendix C & D).

5.3.2.3.5 Children's and parents' activity (PA & SB) perception

Children's PA & SB perceptions were measured using the self-report Children's Leisure Activities Study Survey (CLASS) (Telford et al., 2004). This questionnaire is validated for children aged 10-12 years, however the validity and reliability of this self-report questionnaire has been confirmed for children aged 9-12 years in China (Huang et al., 2009a). This is a self-report, seven day recall questionnaire that assesses type, frequency, and intensity of PA and SB over a usual week. This questionnaire consists of 30 PAs and 14 SBs. Of the 30 PAs, 18 are classified as moderate intensity activities and 12 classified as vigorous activities. For instance, bicycling, dance, gymnastics, household chores, physical education class, walking for exercise, walking the dog are examples of moderate activities. Some vigorous activities are as follow: football, basketball, jogging or running, netball, rollerblading. Examples of SBs are: watching TV/videos/computer games, homework, reading and talking. Children were asked to indicate whether they had engaged in the named activity during the last week and if their answer was yes, they were asked to report how many times and for how long (minutes) they did that activity for both weekdays and weekend days over the past seven days. The duration of activities given by children for each of the categories of sedentary, moderate and vigorous was summed to measure the average time (minutes) spent on moderate, vigorous, MVPA and SB throughout all domains, including school time and leisure time during weekdays, weekends, and for one week (Appendix D).

Also, in case an activity was not on the list, there was the option of ‘other’ for indicating the name of an activity by a participant. The same item was available for SB. The intensity of each activity in the CLASS questionnaire has been classified based on the information published in the updated compendium of PAs by assigning metabolic equivalent units (METs) of each activity to the related group. Activity is considered: sedentary for METs less than 1.5, Moderate for 3-6 METs and vigorous for METs bigger than 6 (Ainsworth, et al., 2000). Therefore, in case a participant names an activity which is not in the checklist, the category of that activity can be clarified by referring to the updated compendium of physical activities. For instance, if a child has engaged in “Karate” which is not on the checklist he/she has the opportunity to write it in the “other” section. Based on the information published in the updated compendium of PAs the METs for Karate is “10” and therefore Karate is classified as vigorous (METS >6) and the duration of this activity will be added to the minutes the child spends on vigorous activities.

Likewise, parents’ perceptions of their child’s PA & SB were measured using the CLASS proxy-report, which is identical to the children’s questionnaire (Telford et al., 2004). Parents were asked to indicate whether their child had the named activity in the checklist during the last week and if their answer was yes, they were requested to report how many times and for how long (minutes) their child engaged in that activity for both weekdays and weekend days over the past 7 days. Similar to the self-report questionnaire, there was an option of “others” for parents in case their child had engaged in an activity which was not on the list. The same scoring as children’s self-reports was used to measure parents’ perceptions of their child’s MVPA and sedentary activities (Appendix C).

5.3.2.3.6 Perceived physical Competence (FMS perception)

To assess perceived physical competence of children, the Athletic Competence sub-scale of Harter's (1985) Self-Perception Profile for Children (SPPC) aged 8-15 years was used. This sub-scale has six questions that assess children's self-perception of their physical competence. In order to improve the reliability of the perceived FMS instrument and to provide a measure that is specifically related to the actual tested skills measured in the TGMD-2, Southall et al., (2004) modified Harter's Athletic Competence sub-scale by adding the related 12 items to that sub-scale (Southall et al., 2004; Jones et al, 2010). As actual FMS in this study was measured by applying the TGMD-2 instrument, the modified version by Southall et al. (2004) consisting of 18 questions was used to make it relevant to the tested skills (Appendix D). Each item consisted of two opposite descriptions of a child. An example item is: *Some kids do very well at all kinds of sports BUT other kids don't feel that they are very good when it comes to the sports*". The child is first asked to decide which kind of child he /she is the most like and then the child should decide whether or not the chosen description is "Sort of true" or "Really true" for him/her. The range of scores for each item is from 1 to 4. A higher score reflects a higher perceived competence. The scores are then summed to provide an overall score of perceived physical competence or FMS perception (maximum total score is 72). The internal reliability for the scale in this study was α=0.88.

Parents' perception of their child's physical competence was measured using the athletic competence sub-scale of Harter's teacher rating scale (TRS) which is parallel to the SPPC (Harter, 1985). As recommended by Harter (1985), this scale can be reworded to be used by adults other than teachers, including parents. Subscales in the teacher rating scale have three questions each. Like the applied measurement for children's perceived competence in this study, in order to improve the reliability of parents' perceived FMS measurement and make it relevant to the actual tested skills measured using the TGMD-2 (Southall et al., 2004; Jonse et al, 2010), 12 items were added to the 3 reworded items of athletic competence with the same format (Appendix C). An example item is: which is truer about your child '*My child does really well at all kinds of sport' or 'My child is not very good when it comes to sport*'. The parents are asked to indicate whether their choice is "Sort of true" or "Really true" about the child. The range of scores for each item is from 1 to 4. A higher score reflects a higher perceived competence. The scores are then aggregated to provide an overall sum of parents' perceived physical competence of their child (maximum total score is 60). The internal reliability for the scale in this study was α=0.94.

5.3.2.4 Statistical analysis

The UK 90 growth reference (1990), CDC (2000) and BF reference curves (2006) for children were applied to the data and were compared using Cohen's Kappa inter-rater reliability to support agreement for the prevalence of obesity between these references.

Data was analysed using IBM SPSS Statistics Version 21 and the statistical significance level was set at $p<0.05$. Variables were assessed for normal distribution for both normal weight and overweight groups using Shapiro-Wilk's test ($p>.05$) (Razali, & Wah, 2011; Shapiro & Wilk, 1965) and visual inspection of their histograms, normal Q-Q plots and box plots. Of the twenty-two variables only nine were normally distributed and the following tests (mostly nonparametric) were applied: Mann-

Whitney U tests were applied to examine differences between normal weight and overweight children in PA, SB and FMS scores. It should be noted that regarding examining PA, throughout this thesis only MVPA was used (either actual or perceived).

In order to examine the accuracy of parents' and children's perceptions of the child's weight status, Cross tabulation, and Fisher exact tests were applied. The Fisher exact test was considered as opposed to chi-square since the size of some cells was <5 and in some cases, there were cells of zero.

In order to examine the accuracy of parents' and children's perceptions of PA of the child, Spearman correlation tests were applied to examine if there were correlations between their perceptions of MVPA and the child's actual MVPA for each weight group. Additionally, to test if there was a significant difference between parents' and children's perception of the minutes a child spent in MVPA and the number of minutes children actually spent in MVPA, Wilcoxon tests were conducted separately for overweight and normal weight children. To examine the accuracy of parents' and children's perceptions of SB of children, the same tests were applied to examine relationships and test for significant differences between SB perceptions and actual SB (i.e. Spearman correlations and Wilcoxon tests) separately for normal weight and overweight groups.

The accuracy of parents' and children's perceived FMS competency was examined using correlation tests between actual and perceived FMS. To examine if there was a relationship between children's actual FMS competency and their parents,' perceived FMS competency Pearson correlation and Spearman correlation tests were used respectively for normal weight and overweight children. Spearman correlation tests were used to examine if there was a relationship between the child's actual FMS competency and his/her perceived FMS competency for both normal and overweight groups (i.e. accuracy of children's perceptions). Only correlation tests were used as the total scores for parents' perceived competence (max. 60), children's perceived competence (max. 72) and FMS competence (max. 90) were different due to having three different scales. Thus, direct comparison, using tests of difference, was not possible.

5.3.3 RESULTS

Due to the small group size of overweight (14) and obese (13) categories these two groups were combined and labelled as "overweight". In addition, since there was a small number of underweight children (N=2) their data were excluded from the analyses. This resulted in data from 98 children (57 girls and 41 boys; mean age 9.5±0.6) and their parents (83 mothers, 15 fathers) being analysed. There was agreement for weight categories between the UK 90 and CDC (2000) references (Kappa coefficient was 0.92) and for the UK 90 and BF reference curves (2006) (Kappa coefficient was 0.57). All agreements were statistically significant ($p<0.001$). Therefore, BMI categories based on the UK 90 growth reference for children were used for analysing the data. The number of children in normal and overweight categories by age and sex specific BMI percentiles according to the UK 90, CDC and BF reference curves are presented in table 1. Mean ± SD and median of BMI (kg/m^2) and BMI centiles for normal weight and overweight children are presented in table 2.

Table 1. Number of children in each weight category based on three different references (UK 90, CDC, BF %).

Reference	**Number of children (98)**					
	Uk 90		CDC		BF %	
Weight category	Normal	Overweight	Normal	Overweight	Normal	Overweight
Numbers	71	27	70	28	73	25

Table 2. Mean ± SD and median of BMI (kg/m2) and BMI centiles for children.

	Normal (n71)		**Overweight (n27)**	
	Median	Mean	Median	Mean
BMI (kg/m^2)	15.9	16±1.3	20.7	21.7±3.1
BMI Centiles	35	37.7±23	93	93.2±5

The response rate was 100% for all questionnaires except for the visual weight perception tool; 11 children as well as their parents in one of the schools were not given the visual questionnaire due to a request from the school. Therefore, for the visual instrument, data from only 86 participants were analysed. The prevalence of overweight including obese children was 27.8 % (13.4% for boys and 14.4 % for girls). Descriptive statistics for children's and parents' demographic characteristics are summarised in table 3 and the study variables are summarised in table 4. Although in the demographic questionnaire parents were asked to report their own height and weight, few parents provided this information, so it was not possible to use it to calculate their BMI and it is not included in the table.

Table 3. Parents' and children's demographic scores mean ± SD, or number (percentages).

Variable	Normal (71) Mean± SD	Overweight (27) Mean± SD	Total (98) Mean± SD
Child			
Age (years)	9.4±0.6	9.6±0.6	9.5±0.6
Height (cm)	135±7	141.63±8.9	137.1±8
Weight (kg)	29.3±4.5	43.6±7.8	33.2±8.4
Gender (%)			
Boys	27(38)	14(51.9)	41(41.8)
Girls	44(62)	13(48.1)	57(58.2)
Year Group (%)			
Year 4	46(64.8)	13(48.1)	59(60.2)
Year 5	25(35.2)	14(51.9)	39(40)
Ethnicity (%)			
White	54(76)	16(59.3)	70(72.16)
Mixed	8 (11.3)	1(3.7)	8(8.2)
Asian	2(2.8)	7(25.9)	9(9.2)
Black	3(4.2)	2(7.4)	5(5.1)
Others	4(5.6)	1(3.7)	5(5.1)
Parent			
Age(years)	40.06±4.3	39.72±5.2	39.9±4.5
Gender (%)			
Male	9(12.7)	6(22.2)	15(15.3)
Female	62(87.3)	21(77.8.6)	83(84.7)
Ethnicity (%)			
White	55(77.6)	16(59.3)	71(72.4)
Mixed	4(5.6)	1(3.7)	5(5.1)
Asian	3(4.2)	8(29.6)	11(11.3)
Black	4(5.6)	2(27.4)	6(6.1)
Others	5(7)	0	5(5.1)
Education (%)			
High school degree	19(27.5)	14(51.8)	17(34.7)
University degree	50 (72.5)	12(44.4)	62(65.3)
Marital Status (%)			
Married	62(87.1)	19(70.4)	81(85.3)
Single	8(11.4)	6(22.2)	14(14.7)

Table 4. Descriptive statistics of children's actual MVPA, SB and FMS, and children's and Parents' perceptions of MVPA, SB and FMS of the child, mean ± SD, median for all children

	Normal (71)		Overweight (27)	
Variable	Median	Mean ± SD	Median	Mean ± SD
Child				
Physical competence				
Loco-motor	37	37±4	32	31±5
Object-Control	32	32±6	32	30±4
Total FMS	67	68±8	63	61±7
Perceived competence	60	59±8	60	59±7
Physical activity				
Minutes in MVPA	110	112±50	89	96±40
Minutes sedentary	341	350±100	366	398±88
MVPA perception (mins)	124	136±66	117	150±100
SB perception (mins)	255	288±178	210	288±221
Parent				
MVPA perception (mins)	97	111±78	98	110±48
SB perception (mins)	251	294±176	289	292±156
Perceived competence	47	47±7	46	46±7

5.3.3.1 Actual PA, SB and FMS level of normal weight and overweight children

Regarding actual PA (MVPA), no significant difference (U=817, z=-1.1 p>0.05) was found in MVPA between normal weight and overweight children (median=110 minutes vs median=89 minutes respectively). Results showed that the majority of normal weight (82%) and overweight (85%) children in this study met the recommended daily 60 minutes MVPA and were physically active. A significant difference (U=687.5, z=-2.1 p<0.05) was found for the minutes children spent in SB between normal weight and overweight children whereby overweight children spent more time sedentary (median=341 minutes vs median=366 minutes). There were also significant differences between groups for total FMS score (U=522.5, z=-3.4, p<0.01) and loco-motor scores (U=367.5, z=-4.5, p<0.001). Normal weight children had higher locomotor (median= 37 vs median= 32, p<0.05) and FMS competence scores (median= 67 vs median= 63, p<0.05) than overweight children. No significant difference (U=829 & z =-1.1, p>0.05) was found in their object-control skills (median= 32 for both) (descriptive data are shown in table 4).

5.3.3.2 Parents' awareness of their child's weight status, PA, SB and FMS.

5.3.3.2.1 Parents' weight status awareness

Applying a 2*2 cross tabulation test for both weight groups, no significant differences (p>0.05, Fishers Exact test) were found between children's actual weight category and parents' perception of their child's weight category for normal weight children with both verbal and visual questionnaires. Regarding overweight children, there were significant differences ($p<0.001$, Fishers Exact test and Pearson Chi-Square test respectively for verbal and visual tools) between children's actual weight category and parents' perception of their child's weight category verbally and visually. Utilizing the verbal tool, the majority of parents of children classed as overweight (81.5%) misperceived their child's weight as normal (table 5). With the visual tool, as table 6 shows, 50% of the parents of overweight children misperceived their child's weight as normal. In addition, 6% of parents of normal weight children misperceive their child's weight category as overweight. Comparing the results of visual and verbal tools for those who were given both tools it was found that using the visual tool parents of overweight children were more accurate in perceiving their child's weight compared to the verbal tool (50% accuracy vs 18.5%). The results for children's perceptions were similar and will be discussed later.

Table 5. Parents' and children's verbal weight perception compared to the child's actual BMI

		Parents verbal perception		**Children verbal perception**	
		normal	overweight	normal	Overweight
Actual BMI (kg/m^2)	Normal (71)	71 (100%)	0	71(100%)	0
	Overweight (27)	22 (81.5%)	5 (18.5%)	23 (85%)	4 (15%)

Table 6. Parents' and children's visual weight perception compared to the child's actual BMI

		Parents verbal perception		**Children verbal perception**	
		normal	overweight	normal	Overweight
Actual BMI (kg/m^2)	Normal (65)	61 (94%)	4 (6%)	62 (95.5%)	3 (4.5%)
	Overweight (22)	11 (50%)	11 (50%)	12 (55.5%)	10 (45.5%)

5.3.3.2.2 Parents' PA awareness

Regarding the accuracy of parents' perception of their child's PA, significant correlations were found between parents' perception of MVPA and the child's actual MVPA ($rs=0.28$ & $rs=0.15$ all $p<0.05$) for normal weight and overweight groups, respectively. In addition, results of Wilcoxon tests showed no significant differences ($z=-0.5$; $z=-1$, both $p>0.05$, respectively for normal and overweight) between the average number of minutes children actually spent in MVPA and their parents' perception of those minutes for both normal weight (median=111 minutes vs median=110 minutes respectively for actual PA and parents' perception) and overweight groups (median=97 minutes vs median= 110 minutes respectively for actual PA and parents' perception) (See table 4).

5.3.3.2.3 Parents' SB awareness

Regarding the accuracy of parents' perception of the child's SB, no significant correlations ($rs=-0.15$. & $rs=0.16$ all $p>0.05$) were found between parents' perception and the child's actual SB for normal weight and overweight groups.

In addition, results of Wilcoxon tests showed significant differences ($z=-2.5$, $z=-2.9$, both $p<0.05$, respectively for normal and overweight) between the average weekly minutes a child actually spent in SB and the parents' perception of the average weekly number of minutes for normal weight (median=341 minutes vs median=251 minutes respectively for actual SB and parents' perception) and overweight groups (median=366 minutes vs median=289 minutes respectively for actual SB and parents' perception). Both parents of normal weight and overweight children underestimated their child's SB, but as shown earlier, overweight children actually engaged in significantly more SB than normal weight children (See table 4).

5.3.3.2.4 Parents' FMS awareness

Regarding the accuracy of parents' perceptions of physical competency, there was a positive significant correlation between actual FMS and parents' perception of the child's physical competence for normal weight children ($r=0.23$, $p<0.05$). No significant correlation was found between actual FMS and parents' perception of their child's physical competence for overweight children ($rs=-0.16$, $p>0.05$). Thus, only parents of normal weight children were aware of their child's FMS.

5.3.3.3 Children’s awareness of their weight status, PA, SB and FMS.

5.3.3.3.1 Children’s weight status awareness

For testing accuracy of children’s weight perception, a 2*2 cross tabulation test was applied. Regarding overweight children, with both verbal and visual measurements, there were significant differences ($p<0.001$, Fisher’s Exact test and Pearson Chi-Square test respectively for verbal and visual tools) between children’s actual weight category and children’s perception of their own weight category. No significant difference ($p>0.05$, Fisher’s Exact test) was found for the normal weight group in this regard both verbally and visually.

Table 5 shows the results of children’s verbal perception of their own weight status. The majority of children classed as overweight (85.2%) misperceived their weight as normal. With the visual measurement, as can be seen in table 6, almost half of the overweight children (54.5%) misperceived their own weight. In addition 4.5% of normal weight children misperceived themselves as overweight. Comparing the results of visual and verbal tools for those who were given both tools it was found that with the visual tool overweight children had more accurate perception of their own weight compared to the verbal tool (45.5% accuracy vs 18.2%).

5.3.3.3.2 Children's PA awareness

Regarding the accuracy of childrens' perception of their PA (MVPA), no significant correlations (rs=0.05 & rs=0.03both p>0.05) were found between their perception and actual MVPA for normal weight and overweight groups.

In addition, a significant difference (z=-2.1, p<0.05 & z=-2.65, p<0.05 for normal and overweight respectively) was found between the average number of minutes children actually spent in MVPA and the average number of minutes children reported they spent in MVPA weekly (median= 110 minutes vs median= 124 minutes and median= 89 minutes vs median= 117 minutes respectively for normal and overweight). Both groups overestimated their average weekly minutes of MVPA (see table 4).

5.3.3.3.3 Children's SB awareness

Regarding the accuracy of childrens' perception of their SB, no significant correlations (rs=0.21 & rs=-0.27 both p>0.05) were found between their perception and actual SB for normal weight and overweight groups.

In addition, for both normal weight and overweight groups, there were significant differences (z=-3.6, p<0.05 & z=-2.4, p<0.05) between the average weekly minutes a child spent sedentary and his/her perception of the average number of minutes he/she spent sedentary during a week (median= 341 minutes vs median= 255 minutes and median= 366 minutes vs median= 210 minutes respectively for normal and overweight). Both groups underestimated their average weekly minutes spent in SB (see table 4).

5.3.3.3.4 Children's FMS awareness

Regarding the accuracy of children's perceptions, no significant correlation was found between actual FMS and children's perception of their own physical competence for normal weight ($r_s = 0.16$, $p > 0.05$) and overweight ($r_s = -0.05$, $p > 0.05$) children. This suggests that both groups were not able to accurately perceive their own physical competency.

5.3.4 Summary

In the present study, the following questions were addressed:

1) Are there significant differences in actual PA, SB and FMS levels between normal weight and overweight British children? Results showed there were no significant differences in actual PA between normal weight and overweight children while overweight children had significantly higher SB and lower FMS than normal weight children.

2) Are British parents of normal weight and overweight children aware/accurate in their perception of their child's weight status, PA, SB and FMS levels? Results showed: a) parents of overweight children significantly underestimated their child's weight status, b) Both parents of normal weight and overweight children underestimated the SB of their child, c) Parents of normal weight and overweight children were aware of their child's MVPA, d) Parents of overweight children were not able to accurately perceive their child's FMS competency while parents of normal weight children were more aware.

3) Are British normal weight and overweight children aware/accurate in their perception of their weight status, PA, SB and FMS levels? Results showed: a) overweight children significantly underestimated their weight status, b) Both normal weight and overweight children underestimated

their SB, c) children in both groups overestimated their MVPA, d) both normal weight and overweight children were unable to accurately perceive their FMS competency.

The findings of the study are discussed at the end of this chapter but they do show some misperceptions especially in relation to overweight status so these same issues are explored in Iran in Study 2.

5.4 Study 2: Iranian parents' and children's awareness of weight status, PA, SB and FMS of the child.

The present study aims to examine:

The extent to which Iranian parents and children (aged 8-10 years) are aware of the child's weight status, PA, SB and FMS in normal weight and overweight children.

The Objectives of the study are to examine:

1) Actual PA, SB and FMS levels of Iranian normal weight and overweight children aged 8-10 years.

2) Iranian parents' and children's awareness/accuracy of their perception of the child's weight status, PA, SB and FMS in normal weight and overweight children.

5.4.1 Questions

1) Are there significant differences in actual PA, SB and FMS levels between normal weight and overweight children?
2) Are parents of normal weight and overweight children aware/accurate in their perception of the child's weight status, PA, SB and FMS level?
3) Are normal weight and overweight children aware/accurate in their perception of their weight status, PA, SB and FMS level?

5.4.2 Methodology

5.4.2.1 Participants

Signed informed consent was obtained for 133 children (mean age 9.8±0.4 years; 62 girls and 71 boys) and their parents; i.e. mothers (102), fathers (29) and guardians (2). All the parents were Persian, with 64.6% educated to a university or higher education degree level. In total, 83% were married or living as married. Children were recruited from two single-sex schools (one for boys and one for girls) in one city in Iran. Participants were from middle SES and the least deprived area.

5.4.2.2 Procedures

Ethical approval was from Middlesex University, London Sport Institute Ethics sub-committee. Collaboration began with academics at a University in Iran (See permission letter from University in Appendix F). Two schools were then recruited from one city in Iran. Following receiving approval from the Physical Education Ministry (Appendix F) a meeting with the head teachers and P.E co-ordinators in each school was arranged. An information pack and consent form along with questionnaires were sent to schools to distribute to the parents of all children aged 8-10 years (in total 150 packages were sent to schools). Of the parents who received the information pack, 133 parents completed the questionnaires and returned signed informed consent for themselves and on behalf of their children (The package was sent home with children and returned by them to their classroom teacher). Participants were informed that they were free to withdraw from the study at any time without giving any reason and that their participation was voluntary. The procedure used in study one (see page 159) was repeated in Iran and data was collected from mid-February to end of March 2017.

5.4.2.3 Measures

5.4.2.3.1 Anthropometric measurements

BMI was measured in the same way as in study one (see page160). However , unlike study one where the UK 90 reference was used to classify children’s weight status, in this study age–sex specific BMI cut off at the reference point provided by the US Centres for Disease Control and Prevention (CDC) was applied to classify children's weight status (Kuczmarski et al., 2000). Children were categorised as follows: normal weight if BMI percentile is 5th-85th, overweight if BMI percentile is ≥85th and obese if BMI percentile is ≥ 95th (Kuczmarski et al., 2000). The CDC reference was used as it is the most frequently used reference for identifying obesity among Iranian children and is shown to be appropriate for use with this population compared to other references (Kelishadi et al., 2014; 2008). This reference was already shown to be similar to other references (UK 90) among UK children in study 1. BF% was also measured in the same way as study 1 (see page 115).

5.4.2.3.2 Children's actual PA, SB and FMS

All the measures used to assess PA, SB and FMS of children were same as study one. For a full description on how FMS was assessed refer to study 1 in this chapter (see pages 161-164).

5.4.2.3.3 Questionnaires

All the questionnaires that were used in study 1 to assess demographics and perceptions of weight status, PA, SB and FMS were translated to Farsi using the back-translation method (see Brislin, 1986) (Appendix C & D). Regarding questionnaires for parents' and children' FMS perception the internal reliability in this study was α=0.91 and α=0.86 respectively. For a full description of the Questionnaires refer to study 1 in this chapter (see pages 164-169).

5.4.2.4 Statistical analysis

The CDC (2000) reference curves for children were applied to the data for the prevalence of obesity.

Statistical analysis was conducted in the same way as study 1 (see page 169). It should be noted that in this study, of the 22 variables, only seven were normally distributed, so parametric tests were used when tests involved these seven variables, and non-parametric tests were used for the other 15 variables.

5.4.3 RESULTS

The response rate for all questionnaires was 100% from children and their parents/guardian. Due to the small group size of overweight (21) and obese (24) categories these two groups were combined and labelled as "overweight". In addition, since there was a small number of underweight children (N=14) and also to keep consistency with study 1, their data were excluded from the analyses. Finally, data from 119 children (55 girls and 64 boys; mean age 9.8±0.4) and their parents (93 mothers, 26 fathers) were analysed. The prevalence of overweight including obese children was 37.9 % (with 22.7% boys and 15.2 % girls). Mean ± SD and median of BMI (kg/m2) and BMI centiles for normal weight and overweight children are presented in table 7.

Table 7. Mean ± SD and median of BMI (kg/m2) and BMI centiles for children.

	Normal (74)		**Overweight(45)**	
	Median	Mean	Median	Mean
BMI (kg/m^2)	15.9	16.2±1.6	20.7	21.5±2.5
BMI Centiles	33.55	38.5±26.3	95	92.6±9.1

Descriptive statistics of children's and parents' demographic characteristics are summarised in table 8 and the study variables are summarised in table 9.

Table 8. Parents' and children's demographic characteristics mean ± SD, or number (percentages).

Variable	Normal (74) Mean± SD	Overweight (45) Mean± SD	Total (119) Mean± SD
Child			
Age	9.8±0.38	9.8±0.43	9.8±0.4
Height	139.2±6.3	144.6±6.5	141.3±6.8
Weight	31.5±4.8	45.3±7.3	36.7±8.9
Gender (%)			
Boys	37 (31.1)	27 (22.7)	64 (53.8)
Girls	37 (31.1)	18 (15.1)	55 (46.2)
Parent			
Father Age	44.19±4.3	43±5	43.7±4.6
Mother age	39.3±4.7	38.05±4.5	38.8±4.7
Gender (%)			
Male	14 (11.8)	12 (10.1)	26 (21.9)
Female	60 (50.3)	33 (27.7)	93 (78.1)
Education (%)			
High school degree	23 (19.3)	16 (13.5)	39 (32.8)
University degree	51 (42.8)	29 (26.4)	79 (69.2)
Marital Status (%)			
Married	59 (49.6)	39 (32.8)	98 (82.3)
Single	13 (11)	5 (4.2)	18 (15.2)
Other	2 (1.6)	1 (.8)	3 (2.5)

Table 9. Descriptive statistics of children's actual MVPA, SB and FMS, and children's and Parents' perceptions of MVPA, SB and FMS of the child, mean ± SD, median for all children

	Variable	Normal (74)		Overweight (45)	
		Median	Mean± SD	Median	Mean± SD
Child					
	Physical competence				
	Loco-motor	36	37±4	32	31±5
	Object-Control	33	33±4.2	32	32±4
	Total FMS	68	69±7	63	63±7
	Perceived competence	55	56±9	55	55±8
	Physical activity				
	Minutes in MVPA	89	91±36	60	73±41
	Minutes sedentary	300	307±108	352	343±85
	MVPA perception (mins)	146	176±127	145	175±116
	SB perception (mins)	252	269±142	325	330±170
Parent					
	MVPA perception (mins)	94	127±101	99	116±64
	SB perception (mins)	333	368±139	385	423±143
	Perceived competence	50	50±6	46	46±7

5.4.3.1 Actual PA, SB and FMS levels of normal weight and overweight children

A significant difference (U=1135, z=-2.9, p<0.001) was found for children's MVPA between normal weight and overweight children (median =89 minutes vs median =60 minutes respectively for normal and overweight children) with overweight children doing less PA. Results showed that in total 81% of normal weight children and 51% of overweight children in this study met the recommended daily 60 minutes MVPA. A significant difference (U=1283, z=-2.09, p<0.05) was found for the minutes children spent in SB between normal weight and overweight children whereby overweight children spent more time sedentary (median=300 minutes vs median=352 minutes respectively for normal and overweight children). There were significant group differences for total FMS scores (U=1036, z =-3.45, p<0.001) and locomotor scores (U=1023, z=-3.5, $p<0.001$) between normal weight and overweight groups. Normal weight children had higher locomotor (median=36 vs median=32 $p<0.001$) and total FMS competence scores (median=68 vs median=63) than overweight children. No significant difference (U=1336, z =-1.8, $p>0.05$) was found in their object-control skills (median=33 vs median=32) (descriptive data are shown in table 9).

5.4.3.2 Parents' awareness of their child's weight status, PA, SB and FMS.

5.4.3.2.1 Parents' weight status awareness

A 2*2 cross tabulation test for both weight groups was applied. No significant differences ($p>0.05$, Fishers Exact test and Pearson Chi-Square test respectively for verbal and visual tools) were found between children's actual weight category and parents' perception of their child's weight category for normal weight children with both verbal and visual questionnaires. Regarding overweight children, with both verbal and visual questionnaires, there were significant differences ($p<0.001$, Pearson Chi-Square test) between children's actual weight category and parents' perception of their child's weight category. Regarding the verbal tool, nearly half of parents of children classed as overweight (46.7%) misperceived their child's weight as normal (table 10). With the visual tool, table 11 shows that 77.8% of the parents of overweight children were able to accurately perceive their child's weight while the other 22.2% misperceived their child's weight as normal. In addition, 10.8% of parents of normal weight children misperceived their child's weight category as overweight with the visual tool. Comparing the results of the visual and verbal tools, it was found that with the visual tool parents of overweight children had more accurate perception of their child's weight compared to the verbal tool (77.8% accuracy vs 53.3%). The results for children's perceptions were similar but will be discussed later.

Table 10. Parents' and children's verbal weight perception compared to the child's actual BMI

		Parents verbal perception		Children verbal perception	
		normal	overweight	normal	Overweight
Actual BMI (kg/m^2)	Normal (74)	74 (100%)	0	74 (100%)	0
	Overweight (45)	21 (46.7%)	24 (53.3%)	23 (51.1%)	22 (48.9%)

Table 11. Parents' and children's visual weight perception compared to the child's actual BMI

		Parents visual perception		Children visual perception	
		normal	overweight	normal	Overweight
Actual BMI (kg/m^2)	Normal (74)	66 (89.2%)	8 (10.8%)	69 (93.2%)	5 (6.8%)
	Overweight (45)	10 (22.2%)	35 (77.8%)	13 (28.9%)	32 (71.1%)

5.4.3.2.2 Parents' PA awareness

Regarding the accuracy of parents' perception of their child's PA, no correlations were found between parents' perception of MVPA and the child's actual MVPA (rs=0.17 & rs=0.26 all p>0.05) for normal weight and overweight groups. In addition, results of Wilcoxon tests showed there were significant differences (z=-2.6 & z=-3.9; p<0.05) between the average number of minutes children actually spend in MVPA and their parents perception of those minutes both for normal weight and overweight groups. In summary, parents of all children had overestimated their children's average MVPA (median=89 minutes vs median=94 minutes respectively for actual PA and parents' perception among normal weight children and median=60 minutes vs median=99 minutes respectively for actual PA and parents' perception among overweight children). (Descriptive data is summarised in table 9).

5.4.3.2.3 Parents' SB awareness

Regarding the accuracy of parents' perception of the child's SB, no significant correlations ($rs=0.1$ & $rs=0.3$, both $p>0.05$) were found between parents' perception and the child's actual SB for normal weight and overweight groups. In addition, results of Wilcoxon tests showed for both normal weight and overweight groups there were significant differences ($z=-2.87$ & $z=-2.95$; $p<0.01$) between the average weekly minutes a child actually spent in SB and the parents' perception of the average number of minutes their child spent sedentary. All parents had overestimated the SB of their children (median=300 vs median=333 minutes respectively for actual SB and parents' perception among normal weight children and median=352 vs median=385 minutes respectively for actual SB and parents' perception among overweight children) (descriptive data are summarised in table 9).

5.4.3.2.4 Parents' FMS awareness

Regarding the accuracy of parents' perceptions of physical competence, there was a positive significant correlation between actual FMS and parents' perception of the child's physical competence for normal weight children ($rs=0.25$, $p<0.05$) (see table 9). No significant correlation was found for overweight children between actual FMS and parents' perception of the child's physical competence ($r=0.24$, $p>0.05$). Therefore, parents of the normal weight group had more accurate perception of their child's FMS compared to parents of the overweight group.

5.4.3.3 Children's awareness of their own weight status, PA, SB, and FMS

5.4.3.3.1 Children's weight status awareness

A 2*2 a cross tabulation test was applied for testing accuracy of children's weight perception. Regarding overweight children, with both verbal and visual measurements, there were significant differences ($p<0.001$, Pearson Chi-Square) between children's actual weight category and children's perception of their own weight category. No significant difference ($p>0.05$, Fisher's Exact test and Pearson Chi-Square test respectively for verbal and visual tools) was found for the normal weight group in this regard. Table 10 shows the results of children's verbal perception of their own weight status. Half of children classed as overweight (51%) misperceived their weight as normal while 49 % were able to accurately perceive their weight status. With the visual measurement, as can be seen in table 11, 28.9% of overweight children misperceived their own weight while 71.1% are able to accurately perceive their weight status. In addition 6.8% of normal weight children misperceive themselves as overweight with the visual test. Comparing the results of visual and verbal tools, it was found that with the visual tool overweight children had more accurate perception of their own weight compared to the verbal tool (71.1% accuracy vs 49%).

5.4.3.3.2 Children's PA awareness

Regarding the accuracy of children's perception of their PA (MVPA), no significant correlations ($r_s=0.01$ & $r_s=0.18$, both $p>0.05$) were found between their perception and actual PA for normal weight and overweight groups. In addition, for both normal weight and overweight groups there were significant differences ($z=-4.7$ & $z=-4.8$; $p<0.05$) between the average number of minutes children actually spend in MVPA and their perception of those minutes. For both normal weight and overweight groups children overestimated their average weekly MVPA (median=88.8 minutes vs median=146 minutes respectively for actual PA and children's perception among normal weight children and median=60 minutes vs median=145 minutes respectively for actual PA and children's perception among overweight children) (see table 9).

5.4.3.3.3 Children's SB awareness

Regarding the accuracy of childrens' perception of their SB, no significant correlations ($r_s=0.11$ & $r_s=0.5$, both $p>0.05$) were found between their perception and the child's actual SB for normal weight and overweight groups. In addition, for normal weight children there was a significant difference ($z=-2$; $p<0.05$) between the average weekly minutes a child actually spent in SB during a week and their perception of the minutes they spent sedentary (median= 300 minutes vs median=252 minutes). They underestimated their own SB. No significant difference was found in the overweight group ($z=-1.05$; $p>0.05$) between the average minutes a child actually spent in SB during a week and their perception of the average number of minutes they spent sedentary (median= 352.5 minutes vs median=325 minutes).

5.4.3.3.4 Children's FMS awareness

No significant correlation was found between actual FMS and children's perception of their own physical competence for normal weight ($r_s=0.12$, $p>0.05$) and overweight ($r = 0.17$, $p>0.05$) children. Thus, neither normal weight nor overweight children were aware of their FMS level.

5.4.4 Summary

In the present study, the following questions were addressed:

1) Are there significant differences in actual PA, SB and FMS levels between normal weight and overweight Iranian children? Results showed overweight children had significantly higher SB as well as lower FMS and PA than normal weight children.

2) Are Iranian parents of normal weight and overweight children aware/accurate in their perception of their child's weight status, PA, SB and FMS level? Results showed a) parents of overweight children significantly underestimated their child's weight status, b) Both parents of normal weight and overweight children overestimated the PA of their child, c) Parents overestimated their child's SB in both groups, d) parents of normal weight children were accurate in perceiving their child's FMS level, while parents of overweight were less accurate in perception of their child's FMS.

3) Are Iranian normal weight and overweight children aware/accurate in their perception of their weight status, PA, SB and FMS level? Results showed a) overweight children significantly underestimated their weight status, b) Both normal weight and overweight children overestimated their PA, c) Overweight children had more accurate perception of their SB than normal weight children, d) both normal weight and overweight children were not accurate in their FMS perception.

The findings of the study are discussed at the end of this chapter. They show some similarities and differences to the findings from the UK in Study 1, so the two countries are compared directly in Study 3.

5.5 Study 3: A cross-cultural study comparing the accuracy of parents' and children's perception (awareness) of the child's weight status, PA, SB and FMS levels between the UK and Iran for both normal weight and overweight children.

The aim of this study is to examine British and Iranian parents' and children's accuracy level in their perception of the child's weight status, PA, SB and FMS level for normal weight and overweight children.

Objectives of study 3 are to:

1) Compare weight status and actual PA, SB and FMS levels of British and Iranian children.

2) Compare the accuracy of British and Iranian parents' perception (awareness) of their child's weight status, PA, SB and FMS level in both normal weight and overweight children.

3) Compare the accuracy of British and Iranian children's' perception (awareness) of their weight status, PA, SB and FMS level between UK and Iran in both normal weight and overweight children.

5.5.1 Questions

1) Are there significant differences between British and Iranian children's weight status, PA, SB and FMS for i. normal weight children and ii. overweight children?

2) Are there significant differences between British and Iranian parents in accuracy of their perceptions/awareness of their child's weight status, PA,

SB and FMS levels for i. normal weight children and ii. overweight children?

3) Are there significant differences between British and Iranian children in accuracy of their perceptions/awareness of their weight status, PA, SB and FMS levels for i. normal weight children and ii. overweight children?

5.5.2 Methodology

As this study is statistically comparing the data from study 1 (UK) and study 2 (Iran), all the information regarding the methodology including, participants, procedure and measures has been provided earlier in this chapter (see pages 159-170 & 183-186)

5.5.2.1 Statistical analysis

Data was analysed using IBM SPSS Statistics Version 24 and the statistical significance level was set at $p<.05$. Variables were initially assessed for normality distribution for both normal weight and overweight groups using Shapiro-Wilk's test ($p>.05$) (Razali, & Wah, 2011; Shapiro & Wilk, 1965) and visual inspection of their histograms, normal Q-Q plots and box plots. Some of the variables were not normally distributed and therefore the appropriate tests for variables were applied (i.e. non parametric or parametric tests).

For examining the difference between British and Iranian children's actual PA, SB and FMS appropriate t-tests or Mann-Whitney tests were applied.

Accuracy of parents' and children's perception of weight was determined by examining the difference between parents' and children's weight perception category and the actual weight category. If their perception was equal to the child's actual weight category, they were considered "accurate" and were given code "1" and if their perception was not equal to the child's actual weight category they were considered "inaccurate" and were given a code "2". Then in order to compare the accuracy of parents' and children's perception of the child's weight status between the UK and Iran, Cross tabulation Pearson Chi-Square tests were applied.

Accuracy of parents' and children's perception of PA and SB was assessed by calculating the difference between perception and the actual variables for both parents and children. If the number was positive, it is indicating overestimation and if it was negative it indicates underestimation. Also, a number closer to zero is more accurate. Parents' accuracy of SB perception between the two countries was compared by applying a t-test. The same test was used for comparing children's accuracy. This was done separately for normal weight and overweight groups. Accuracy of PA perception was not normally distributed for both children and parents for normal weight children and therefore to compare parents' and children's accuracy of their perception of minutes children spent in PA between the two countries a Mann-Whitney U test was conducted. Regarding overweight children, a t-test was applied for parents' accuracy in their perception of children's PA and for children's accuracy a Mann-Whitney test was applied.

Regarding FMS accuracy, as the total scores for parents' perceived competence (max. 60), children's perceived competence (max. 72) and FMS competence (max.90) were different, calculating the accuracy of their perception directly through deducting their perception from the actual FMS was not possible. Thus, due to having three different scales, raw scores from these variables were converted to z scores. Accuracy of perceived physical competence (FMS competency) was then determined by calculating the discrepancy between the variables' z scores for both parents and children. Parents' perceived competence accuracy for overweight children was not normally distributed. Thus, to compare accuracy of parents' perceived FMS competency between the UK and Iran a Mann-Whitney U test was used for overweight children, while for the normal weight group a t-test was used. To compare accuracy of children's self -perceived FMS competency between UK and Iran t-tests were used.

All the above tests were applied separately for overweight and normal weight children.

5.5.3 RESULTS

Data from the 217 child-parent dyads were analysed (98 British and 119 Iranian). In total there were 145 normal weight (71 in the UK & 74 in Iran) and 72 overweight (27 in the UK & 45 in Iran) children. BMI Median, Mean ± SD are reported in table 12.

Table.12 Actual BMI (kg/m2) of normal weight and overweight children in the UK & Iran.

	Normal			**Overweight**		
Nationality	N	Median	Mean± SD	N	Median	Mean± SD
UK (%)	71 (72.4)	15.9	15.9± 1.4	27 (27.6)	20.7	21.7± 3.2
Iran (%)	74 (62.2)	15.9	16.1± 1.6	45 (37.8)	20.6	21.5±2.5
Total	145	15.9	16± 1.5	72	20.7	21.6± 2.8

5.5.3.1 Children's actual weight status in UK and Iran

Regarding comparing weight status of children in the two countries a 2*2 cross tabulation test was applied. There was no significant difference ($p>.05$, $X^2=2.5$) in weight status of children between the two countries.

5.5.3.2 Actual PA, SB and FMS level of normal and overweight children in the UK and Iran.

Regarding PA, results of Mann-Whitney tests showed, there is a significant difference in PA levels between British and Iranian children ($U=2063$, $z=-2$ $p<.05$) for the normal weight group (median =110 vs median = 89 minutes) respectively for British and Iranian children and there is a significant difference ($U=396$, $z=-2.5$ $p<.05$) for the overweight group (median=89 vs median=60 minutes), with British normal weight and overweight children having higher levels of PA than Iranian children. All descriptive data are presented in table 13.

Regarding SB, results of t-tests showed there is a significant difference between British and Iranian children ($t(143)=-2.5$, $p<.05$) in their SB for the normal weight group (350±99 vs 308±108 minutes) respectively for British and Iranian children and there is a significant difference ($t(70)=-2.6$, $p<.05$) for the overweight group (398±88 vs 343±85 minutes) with British children in both groups having higher SB than Iranian children (see table 13).

Regarding FMS level, results of Mann-Whitney tests showed no significant difference ($U=2531.5$, $z=-0.4$, $p>.05$) between British and Iranian children in their FMS level for the normal weight group (median=67 vs median=68 respectively for British and Iranian children) and no significant difference ($U=539$, $z=-0.8$, $p>.05$) for the overweight group (median=63 for both nationalities) so FMS levels appear to be the same across both countries for normal weight and overweight children (see table 13).

Table 13. Actual FMS and minutes (min) spent in PA (MVPA) and SB; mean ± SD, Median for normal and overweight children in the UK and Iran.

	Normal				Overweight			
	UK		Iran		UK		Iran	
Variable	Median	Mean±SD	Median	Mean±SD	Median	Mean±SD	Median	Mean±SD
FMS	67	68±8	68	69±7	63	61±7	63	63±7
MVPA (min)	110	112±51	89	91±36	89	96±40	60	73±41
SB (min)	341	350±99	300	308±108	366	398±88	352	343±85

5.5.3.3 Parents' awareness of their child's weight status, PA (MVPA), SB and FMS levels

5.5.3.3.1 Accuracy of weight perception for parents

For comparing the accuracy of parents' perception of weight status of their child between the two nationalities for both verbal and visual tools, 2*2 cross tabulation tests were applied separately for overweight and normal weight children. No significant differences between countries were found for normal weight children with both verbal and visual tools. In contrast there were significant differences in accuracy of parents' weight perception between the two countries with both verbal (X^2=8.5, p<.001) and visual (X^2=5.2, p<.01) tools for the overweight group. Regarding the verbal tool, as seen in table 14 only 18.5 % of British parents of overweight children accurately perceived their child's weight while 53.3% of Iranian parents of overweight children accurately perceived their child's weight. With the visual tool, as shown in table 15, 50% of British parents of overweight children accurately perceived their child's weight while 77.8% of Iranian parents of overweight children accurately perceived their child's weight status. Thus Iranian parents having more accurate perception.

Table 14. The accuracy of parents' perception of the child's weight status with the verbal tool in the UK and Iran (for normal weight and overweight children)

	Normal			Overweight		
Nationality	No	Accurate (%)	Inaccurate (%)	No	Accurate (%)	Inaccurate (%)
UK	74	74(100)	0	27	5(18.5)	22(81.5)
Iran	71	71(100)	0	45	24(53.3)	21(46.7)

Table 15. The accuracy of parents' perception of the child's weight with the visual tool in the UK and Iran (for normal weight and overweight children)

	Normal			Overweight		
Nationality	No	Accurate (%)	Inaccurate (%)	No	Accurate (%)	Inaccurate (%)
UK	65	61(93.8)	4(6.2)	22	11(50)	11(50)
Iran	71	66(89.2)	8(10.8)	45	35(77.8)	10(22.2)

5.5.3.3.2 Accuracy of PA (MVPA) perception for parents

Regarding the accuracy of parents' perceptions of their child's MVPA, the results of a Mann-Whitney test for the normal weight group showed a significant difference (U=2063, z=-2.2, p<.05) between the two countries (median =-9.4 vs median =17.7 respectively for British and Iranian nationalities). Also regarding overweight children, results of a t-test showed a significant difference (t(70)=2.1, p<.05) in accuracy of parents' perception of their child's MVPA between the two countries (13.2±48.3 vs 42.6±60.3). Thus British parents had more accurate perception than Iranian parents for both normal weight and overweight children.

5.5.3.3.3 Accuracy of SB perception for parents

Regarding accuracy of parents' perception of their child's SB, the results of t-tests showed significant differences (t(143)=3.7; t(70)=4.43, both p<.001) between the two countries for normal weight (-58.5±209 vs 60.27±175 respectively for British and Iranian nationalities) and overweight groups (-106±165.3 vs 74.5±168). None of the parents were accurate in their perception of SB of their child. British parents underestimated and Iranian parents overestimated SB of their children for both normal weight and overweight children.

5.5.3.3.4 Accuracy of perceived competence for parents

In examining the accuracy of parents' perceived FMS competency between the UK and Iran, the results of the t-test showed no significant difference (t(143)=1.8; p>.05) for normal weight children (-0.34±1.2 vs 0.01±1.15 respectively for British and Iranian nationalities) and results of a Mann-Whitney U test showed no significant difference (U=559.5, z=-0.6; p>.05) for overweight children (median=0.35 vs median= 0.12) between UK and Iran, so the accuracy of parents' perceptions of competence are the same across countries for both normal weight and overweight children.

5.5.3.4 Children's awareness of their weight status, PA (MVPA), SB and FMS levels

5.5.3.4.1 Accuracy of weight perception for children

To compare the accuracy of children's perception of their weight between the two nationalities for both verbal and visual tools, 2*2 cross tabulation tests were applied separately for overweight and normal weight children. Results showed no significant differences between countries for the normal weight group with both visual and verbal tools. However, for overweight children, significant differences were found with the verbal (Fisher's exact test, p<.01) and the visual (X^2=4.1, p<.01) tools in children's accuracy of weight perception between nationalities. Regarding the verbal tool, as table 16 shows, only 14.8% of overweight British children accurately perceived their weight while 48.9% of overweight Iranian children accurately perceived their weight. As seen in table 17, with the visual tool, 45.5% of overweight British children accurately perceived their weight while 71.1% of overweight Iranian children accurately perceived their weight. This indicates Iranian children have more accurate perception in perceiving their weight status than British children.

Table 16. The accuracy of normal and overweight children's perception of their weight with the verbal tool.

	Normal			Overweight		
Nationality	No	Accurate	Inaccurate	No	Accurate	Inaccurate
UK (%)	74	74	0	27	4(14.8)	23(85.2)
Iran (%)	71	71	0	45	22(48.9)	23(85.2)

Table 17. The accuracy of normal and overweight children's perception of their weight with the visual tool

	Normal			**Overweight**		
Nationality	No	Accurate	Inaccurate	No	Accurate	Inaccurate
UK (%)	65	62(95.4)	3(4.6)	22	10(45.5)	12(50)
Iran (%)	71	69(93.2)	5(6.8)	45	32(71.1)	13(28.9)

5.5.3.4.2 Accuracy of PA (MVPA) perception for children

In comparing the accuracy of children's perception of their own MVPA between the two countries, results of a Mann-Whitney test for the normal weight group showed a significant difference ($U=1935$, $z=-2.7$; $p<.05$) between the two countries in accuracy of the children's perception (median=10.1 vs median=49 respectively for British and Iranian nationalities). Also in the overweight group a significant difference ($U=433.5$, $z=-2.02$; $p<.05$) was found between the accuracy of Iranian and British children in their perception of their MVPA (median=49.3 vs median=90). British normal weight and overweight children had more accurate perception of their PA than their Iranian counterparts.

5.5.3.4.3 Accuracy of SB perception for children

In comparing the accuracy of Iranian and British children in their perception of their SB, the results of the t-tests showed no significant difference ($t(143)=0.78$, $p>.001$) in accuracy of children's perception between the two countries for the normal weight group (-61 ± 176 vs 39 ± 165.55 respectively for British and Iranian nationalities). Regarding the overweight group, applying Mann-Whitney U test a significant difference

(U=426, z=-2.1; p<.05) was found in accuracy of children's perception between the two countries (median= -156 vs median= -47.1 respectively for British and Iranian nationalities). Thus the accuracy of children's perceptions of SB are the same across countries for normal weight children while it differs between countries for overweight children (Iranian overweight children had more accurate perception).

5.5.3.4.4 Accuracy of perceived competence for children

In comparing the accuracy of children's perceived FMS competency between the UK and Iran, the results of t-tests showed a significant difference ($t(70)=-2.6$, $p<.05$) for overweight children (0.9 ± 1.3 vs 0.13 ± 1.2 respectively for British and Iranian nationalities) and no significant difference ($t(70)=-1.8$, $p>.05$) for normal weight children (-0.01 ± 1.2 vs -0.4 ± 1.3). Thus among normal weight children, the accuracy of perceptions of FMS competence is the same across countries, however for overweight children accuracy of perceptions of FMS competence is higher among Iranian children.

5.5.4 Summary

In the present study, no significant difference was found in weight status of children between the two countries. However, significant differences were found between British and Iranian children in their PA and SB (both were higher in the UK) for both normal and overweight groups but there was no significant difference in their FMS level.

Furthermore, the accuracy of parents' and children's perceptions of the child's weight status, PA, SB and FMS competency were compared between Iranian and British nationalities.

Results showed:

1) significant differences in accuracy of parents' and children's perception of the child's weight status between the two countries just for overweight children, with higher accuracy in perceptions of overweight among Iranian parents and children,

2) significant differences in accuracy of parents' and children's perception of PA levels of the child between the two countries for normal weight and overweight groups, with more overestimation of PA among Iranian parents and children,

3) regarding accuracy of SB perception, for parents there were significant differences between the two countries for the normal weight and overweight groups; with UK parents underestimating SB and Iranian parents overestimating SB. However, for children, while there was no significant difference in the accuracy of normal weight children's perception of their SB, a significant difference was found for overweight children; with Iranian participants showing less understimation.

4) Regarding accuracy of parents' perception of FMS, no significant differences were found between the two countries for both normal and overweight children. However, for accuracy of children's perception, there was a significant difference in overweight children, such that there was more overestimation of physical competence among overweight children in the UK than in Iran.

5.6 Studies 1-3 discussion

5.6.1 Actual weight status, PA, SB and FMS level of children

5.6.1.1 Weight status

Comparing weight status of children in the two countries, no significant differences were found in weight status of children, despite the fact that the prevalence of overweight and obesity is higher in UK compared to Iran (Kelishadi et al., 2018; NHS, 2018). This might be related to socioeconomic inequalities of CO in both countries. Although both samples in the two countries were from a similar SES group (middle SES), distribution of CO varies in this SES group. In the UK people with lower SES have higher levels of CO than middle and high SES (Bann, Johnson, Li, Kuh, & Hardy, 2018). In Iran the level of obesity is higher among pepople with middle and high SES (Kelishadi et al., 2018; Khashayar e.t al., 2018). Consequently the samples in both countries might not be reperesentive samples of the population as the rates of CO in population norm data in both countries are different from the CO rates in our studies. In the UK the rate of CO is over 30%, (NAO;2020) while our UK sample has a slightly lower rate of overweight (27.6%). In Iran the CO rate is about 21% (Khashayar et al., 2018) whereas our sample has a higher rate of overweight (37.8%). Thus inequalities in SES of countries regarding CO might have resulted in including more overweight children in Iran and slightly less in the UK, resulting in no diffrence in weight status between children in both countries.

5.6.1.2 PA

In study two in Iran and in previous studies, obese children have been found to engage in lower PA than normal weight children (King et al., 2010; Ness et. al., 2007; Trost et al., 2001). However, results of study one in the UK showed no significant difference in PA levels of overweight and normal weight children which is unusual but consistent with results of a recent study conducted in the Netherlands (van Leeuwen, Koes, Paulis, Bindels, & van Middelkoop, 2020). In their study Van Leeuwen et al. (2020) found no significant differences between activity levels of overweight and normal weight children which was indicated to be related to implementation of intervention programs for increasing PA of children at school and after school in order to tackle CO in this country. Thus, no significant difference between PA of British overweight and normal children might be related to availability of various intervention programs for promoting activity levels of British children (in particular inactive children) in schools and by local councils to address CO in this country (RSPH, 2015; DHSC,2018).

Comparing the PA of children in the two countries, it was found that Iranian children compared to British children were less active in both weight groups. Studies show higher PA levels of children and adolescents in developed countries compared to developing countries including Iran (de Moraes, Guerra & Menezes 2013; Hovsepian et al., 2016; Kelishadi, et al, 2007; 2016). Factors such as limited open spaces and playgrounds in schools and communities, as well as emphasis on academic achievement by parents and school authorities, and replacing PE lessons with other subjects in school, have been reported as explanations for low PA of Iranian children (Khashayar et al., 2018; Mohammadpour-Ahranjani et al,. 2014).

5.6.1.3 SB

Regarding SB, consistent with other studies (King et al., 2010; LeBlanc et. al., 2015; Tremblay et al., 2011) results showed that SB of overweight children in both countries was higher than SB of normal weight children.

In addition, it was found that in both weight groups British children had higher levels of SB compared to Iranian children. This is in contrast with the results of a cross-cultural study by Al-Nakeeb et al., (2012) that found British adolescents have lower SB than their Saudi Arabian counterparts, which was reported to be related to sociocultural differences in the two countries, particularly regarding restrictions imposed on girls. However, their sample was different (adolescents) from the sample in the current research (children aged 8-10 years).

Similar to the results of this PhD research, Kelishadi et al. (2016) demonstrated that the SB of Iranian children in their study is lower than the SB of American children reported in a study by Fakhouri et al. (2013). The economic status of countries has been proposed to impact on the leisure time and SB of people living in high income countries (Felez-Nobrega et al., 2010; Khan, Uddin, Lee, & Tremblay, 2019). This may be related to residents having more access to technologies, modern facilities and electricity that replace some PA. Therefore, higher SB is usual in developed and high income countries while SB is lower in developing/low or middle income countries. This may explain why SB of children in Iran (as a low-income/developing country) is less than SB of children in the UK (as a developed/high-income country). Although in Iran people have access to advanced technology and high speed internet, it is not as advanced as it is in the UK (Akhondzadeh, 2017).

5.6.1.4 FMS

Results from the current studies also illustrated that overweight children have a lower FMS level than normal weight children in both countries which is in line with results of other studies (Bryant et. al., 2014; Cliff et al., 2010; Jones et. al., 2010). In addition, comparing results of British and Iranian children, FMS levels appear to be the same across both countries for normal weight and overweight children. This is while several studies conducted in Australia examining the impact of ethnicity on the FMS level of children living in Australia (Barrnet et. al., 2019; Hardy et. al. 2012; 2016) found lower FMS skills for Asian and Middle Eastern background children than English speaking background children. However, Asian and Middle Eastern background children in those studies were all living in Australia which is different from children in this study who are living in two different countries.

5.6.2 Awareness of weight status, PA, SB and FMS

5.6.2.1 Parents' and children's awareness of the child's weight status

Regarding parents' perception of their child's weight status, results showed that most British, and nearly half of Iranian parents of overweight children, fail to accurately perceive their child's weight status (using the verbal tool). These results are consistent with previous research in western countries (Eckstein et al., 2006; Garrett-Wright, 2011; Maynar et al., 2003; Parkinson et. al., 2017; Rietmeijer-Mentink et al., 2013; Tompkins et al., 2014), Asian countries (Muhammad et al, 2008; Park, 2017) as well as Iran (Akbari et. al., 2006; Pakpour et. al., 2011; Sarrafzadegan et. al., 2013). Likewise, in support of previous research (Angoorani et al., 2017; Cai et al., 2017; Huang et al., 2009a; Hussin et al., 2011; Kelishadi et al., 2015), the current findings demonstrate that the majority of overweight British children (85.2%) and half of overweight Iranian children also misperceived their own weight status.

Results also showed that in both countries the misperception rate was higher for both British parents and children compared to their Iranian counterparts. Studies across the world show various degrees of parents' misperception/inaccuracy of their child's weight perception, from 50.7% to 78.4% in Europe and the US or from 29.7% to 89.2% in Asia, (Lundahl et al., 2014; Park, 2017; Rietmeijer – Mentink et al., 2013). Various degrees of weight self-misperception have also been reported worldwide for children (Cai, et al., 2017; Manios et al. 2014).

Therefore, the findings strengthen the importance of examining and tackling the issue of parents and children not realising the child's weight problem. From a systematic review by Tompkins et al., (2014), it was evidenced that parental misperception had increased compared to results from a similar review in 2006 (Tompkins et al., 2014; Rietmeijer-Mentink et al., 2013). Parents' and children's demographic characteristics such as their age, gender, parents' BMI, parents' personal experiences, parents' education level, and health literacy are proposed to influence parents' misperception (Chan, & Wang, 2013; Eckstein et al., 2006; Garrett-Wright, 2011; Manious et al., 2015; Maynar et al., 2003; Tompkins et al., 2014). However, many studies did not find any significant relationship between the above mentioned factors and parents' misperception (Baughcum et al., 2000; Boutelle et al., 2004; Doolen et al., 2009; Maynard et al., 2003; Polfuss & Frenn, 2012; Town & D'auri, 2009). In the current studies, the group size for overweight children was small (27 in the UK & 45 in Iran) which made it impossible to examine demographic differences in parents' misperception of the child's weight status.

Parents' ethnicity and various sociocultural norms and factors are also suggested as underlying factors for parents' misperception of their child's weight (Chan, & Wang, 2013; Park, 2017). Cultural and behavioural factors linked to ethnicity are considered to have a significant influence on a mother's misperception of her child's weight status (Gualdi-Russo, 2012; Tompkins et al., 2014). For instance, plump/chubby children in some cultures (e.g. African-American, Hispanic, and Asian) are considered healthy and being plump is preferred /accepted as a norm in society (Chan, & Wang, 2013; Park, 2017). This is reported to contribute to the reasons why there is parental underestimation of overweight in children (Aparícioet al., 2013; He & Evans, 2007; Jain et al., 2001; Mejia de Grubb et al., 2018; Park, 2017). This might account for why some Iranian parents have misperceived their child's weight status as also suggested by Kelishadi et al. (2007).

Parents' and children's misperception might also be a result of normalisation of obesity in societies and in certain countries (Binkin et al., 2013; Eckstein et al., 2006; Raquel et al., 2010; Robinson, 2017). A high rate of obesity within a society can result in obese or overweight being more acceptable by the society, thus becoming a social norm (Binkin et al., 2013; Hansen, et al., 2014; Howe et al., 2017). According to social comparison theory, instead of assessing their weight with regards to an adequate reference, individuals tend to compare their weight in relation to the weight and body size of others (Hansen et al., 2014). It has been reported that parents compare their child's body size with other children's (Jones et al., 2011; Parkinson et al., 2017). Thus, as childhood obesity rates increase, it is more likely that parents compare their children with the higher rate of overweight children which may result in a shift in what is a socially acceptable normal weight and body size (Hansen et al., 2014; Parkinson et al., 2017). Therefore, the shift in perceived normal weight could impact parents' perception of their child's weight (Maximova et al., 2008). This may be more likely in the UK than Iran where levels of obesity are higher (over 30% vs 21%) (Khashayar et al., 2018; NAO,2020), which may help explain why levels of misperception in the current studies were higher in the UK compared to Iran.

In this regard several studies have shown that parents from countries with higher rates of CO have higher levels of misperception than parents from countries with lower rates of CO (Hochdorn et al., 2018, Mnios et al 2014). Among European countries, the UK has shown the highest levels of parents' misperception of their child's weight which is proposed to be related to the high rates of CO in this country (Hochdorn et al., 2018; Mnios et al 2014; Robinson, 2017). In the UK results of studies show that there is a shift in social norms of obesity as well as a shift in parents' perception of overweight in children (Jeffery et al., 2005; Jones et al., 2011).

Being exposed to people with high BMI influences a child's perception of being or seeing overweight and obese status as normal (Binkin et al., 2013; Maximova et al., 2008; Parkinson, 2017). As the rate of CO is high in the UK and as it increases in Iran it is more likely that societal norms will affect children's misperception of weight. As discussed for parents, higher rates of CO in the UK also might have resulted in higher levels of children's self- weight misperception in the UK than in Iran.

The verbal versus visual classification (description) tool is considered an important factor in influencing accuracy of an individual's weight perception. As such, more accuracy is reported when using a visual tool (Rietmeijer– Mentink et al., 2013; Tompkins et al., 2014). The present study used verbal and visual instruments, comparing verbal and visual weight perception tools, our data shows that parents' underestimation when utilising the visual tool is lower than the underestimation when using the verbal tool (50% vs 81.5% misperception for British parents and 22.2% vs 46.7% for Iranian parents) in overweight children.

Likewise, results of the current studies showed children were more accurate when using the visual tool in both countries (54.5% vs 85.2%

misperception for British children and 28.9% vs 51% for Iranian children). This means with the visual tool, more parents and children were able to accurately perceive the child's weight status. These findings are in line with the vast majority of results of other studies in western and Asian countries (Cheng et al., 2016; Eckstein et al., 2006; Hernandez et al., 2010; Hussin et al., 2011).

It is proposed that the difference between verbal and visual instruments for weight perception might be related to the negative connotation and stigmatisation of the words overweight/obese in society as it makes parents and children reluctant to verbalise overweight/obesity in their children or themselves (Hussin et al., 2011; Park, 2017; Rietmeijer – Mentink et al., 2013). Although the accuracy of weight perception among overweight children and their parents is better when using the visual tool, the misperception is still high, especially for British parents and children, which might be related to greater normalisation of obesity in the UK. A further potential reason for Iranian parents having more accurate perception than British parents, might be related to Iranian parents being less sensitive in considering their child as overweight compared to British parents (Park, 2017). Research is needed to examine to what extent parents' underestimation is related to stigmatisation/normalisation of overweight /obesity in both countries.

Furthermore, having more accurate perception for Iranian parents might be related to Asian children having higher body fat and abdominal obesity compared to white children at the same BMI (Hsu et al., 2015; Luke, 2009). A study by Shah et al., (2020) showed that UK South Asian children have higher rates of abdominal obesity compared to their British counterparts with a similar BMI (Shah et al., 2020). Considering that abdominal obesity is reported to be high (19.1%) among Iranian children

(Bahreynian, et al., 2015; Sayyari et al., 2017), abdominal obesity might be an indicator for Iranian parents to identify obesity in their children. However, in our studies, children's abdominal obesity was not calculated, and therefore future studies could consider this when comparing the accuracy of parents' perceptions of their children's weight in two different cultures.

Another explanation for parents misjudging their children's weight status is that sometimes being active and having a healthy diet and good appetite results in parental weight misperception (He & Evans, 2007; Jaballas et al., 2011; Jain et al., 2001). In a study by Jain et al. (2001) results revealed that parental misperception was also related to a child's activity level; if children were active, they were not considered overweight or obese. This might be the case for British parents' weight misperception. The results of study one showed that 85% of the overweight children in the UK sample were active (daily MVPA≥60), and study 3 found that all children in the UK sample were more active than children in the Iranian sample. Therefore, the majority of British children being active might be the reason why their parents misperceive their child's weight status.

Regarding children's misperception of their weight, as well as the higher rates of misperception in the UK sample compared to the Iranian sample, our findings might also be explained by the influence of their parents' perception on their self-perception. It is reported that children's ability to correctly perceive their own weight status can be influenced by their parents' misperception (Huang et al., 2009a). This might be supported in the present research by the fact that the percentages of children's verbal and visual misperception were more or less similar to that of their parents in both the countries (50% vs 54.5% visually and 81.5% vs 85.2% verbally, respectively for British parents and children, and 22.2% vs

28.9% visually and 49% vs 51% verbally, respectively for Iranian parents and children). Parental weight misperceptions may cause children to adopt inaccurate perceptions of what is a normal weight for themselves as children and as adults in the future, thus both parents' and children's awareness could be improved (Cheng et al., 2016; Huang et al., 2009).

5.6.2.2 Parents' and children's awareness of the child's PA

5.6.2.2.1 Parents awareness of the child's PA

British parents of both normal weight and overweight children were found to be accurate in their perception of their child's PA. However, Iranian parents of both normal weight and overweight children overestimated their child's MVPA. Possible explanations for these differences will be discussed below. Previous studies on the accuracy of parental perceptions of their child's PA are limited .

British parents being aware of their child's PA might be related to children's actual PA levels. Corder et al., (2010) in their study on the UK's population of children aged 9-10 years, found that of the parents of active children (having 60 minutes of MVPA daily), 69% were aware of their child's activity while the majority of parents of inactive children (having less than 60 minutes of MVPA daily) overstimated their child's PA level. As discussed earlier, in the present studies most British children in both weight groups were physically active (having 60 minutes of MVPA daily) while Iranian children had lower levels of PA in both groups. Thus, according to Corder et al's (2010) findings, higher PA in British children may result in accuracy in parents' perceptions while lower PA of Iranian children might cause parents' overstimation.

In addition, availability of various weight management and PA promotion programs in the UK (from councils and schools) may have raised parents' awareness of the importance of PA for children (DHSC, 2018; RSPH, 201), which may have resulted in British parents being more alert and thus aware of their children's PA levels. In contrast, there is a need for PA promotion programs in Iran (Hovsepian et al., 2016; Kelishadi et al., 2016), so Iranian parents may be less aware of the PA of their children. When parents overestimate their child's PA they will be less likely to encourage their children to participate more in PAs (Corder et al., 2010; 2012; Tompkins et al., 2014). Therefore, improving parental awareness of their children's PA is an important factor for promoting PA and weight related interventions (Corder et al, 2010; 2012; Lopes, Santos, Pereira & Lopes, 2013; Tompkins et al., 2014; van Sluijs, Griffin, & van Poppel, 2007), especially in Iran.

Parents' overestimation of PA is proposed to be related to various factors such as providing socially desirable and positivity biased answers, being unaware of their children's PA when they are not with them, and not observing children (Corder et al., 2010; 2012; Grewal, 2013). A key time parents are not with their children is when they are at school and previous research suggests reasons why Iranian parents may lack awareness of the PA of children in school. For instance, as educational success has priority over PE in school in Iran, sometimes PE lessons may be replaced with other subjects such as maths and science (Kelishadi et al., 2014; Khashayar et al., 2018; Mohammadpour-Ahranjani, et al., 2014) and parents might be unaware of this. Also, there is limited opportunity for active play during the school day in Iran (as the schools are getting smaller and more crowded). Therefore, restrictions and reduced PA levels of children in school might be the reason that Iranian parents are inaccurate in their perception of the amount of PA of children, resulting in the difference between parents' awareness in the two countries.

Weight misperception is shown to result in PA overestimation (Jaballas et al., 2011). In a study by Jaballas et al. (2011) they found that parents overestimated PA and healthy diet of their children but tended to underestimate their child's weight. In contrast Grewal (2013) did not find any association between parents' overestimation of PA of children and the child's BMI, thus indicating that PA overestimation is regardless of children's weight. The results of our studies suggest that weight perception and PA awareness are not associated. The majority of British parents misperceived their child's weight while they were aware of their PA. In contrast, fewer Iranian parents misperceived their child's weight while majority of them overestimated their child's PA. Thus, future work is needed to examine the underlying factors affecting parents' awareness of their child's PA level and weight status.

5.6.2.2.2 Children awareness of their PA

Regarding the accuracy of children's perceptions of their own PA levels, the data showed that in both countries, neither normal weight nor overweight children are aware of their average MVPA during a week and both groups overestimated their activity levels. This is consistent with findings of a systematic review comparing direct and indirect assessments of PA levels of children that showed children overestimate their activity levels (Adamo et al., 2009). Also, in a study by Corder et al., (2010) on British children and their parents, they also found that 46% of children overestimated their MVPA. Results also showed that Iranian children's overestimation was higher than British children's, which might be related to the lower level of their PA compared to British children.

Various factors such as providing socially desirable answers or difficulty in recall of PA durations, as well as children being unable to separate the real self from their fantasy self are some possible explanations for children overestimating their PA level (Adamo et al., 2009; Corder et al., 2010; Grewal, 2013). For instance, one explanation for children's overestimation might be related to children having an exaggerated perception of time when recalling the duration of an activity (Adamo et al., 2009; Grewal, 2013; LeBlanc & Janssen, 2010). For example, it is likely that for a session of 30 minutes of organised activity, which includes listening to the coach /instructor, waiting for their turn and seeing demonstrations or watching other players, they reported the whole 30 minutes as their active time (Grewal, 2013). This is while the actual time recorded by accelerometer is less (Adamo et al., 2009). Thus, it is likely that children consider some short bouts of activity to be longer.

These findings suggest a need for improving both normal weight and overweight children's awareness of their actual levels of PA. As it stands, over-estimators might feel their PA level is sufficient and that they don't need to increase their activity level (Corder et al., 2010, Grewal, 2013). This can lead to lower activity as they grow and during adolescence.

5.6.2.3 Parents' and children's awareness of the child's SB

5.6.2.3.1 Parents' awareness of the child's SB

Regarding SB awareness of parents, it was found that in both countries, parents are unaware of SB of their children with British parents underestimating and Iranian parents overestimating SB of their children for both normal weight and overweight groups. Studies on parents' awareness of SB of their children are limited (Colley et al., 2012; Grewal, 2013; Robinson et al., 2006). Consistent with findings of our study regarding the British population, Grewal (2013) and Colley et al. (2012) reported that most parents tend to underestimate SB of their children.

Several potential factors such as difficulty in recall of duration as well as providing socially desirable answers are proposed to explain parents' underestimation of SB of their children which might have affected parents' awareness in this study (Colley et al., 2012; Grewal, 2013). Another explanation for our findings may be that, as reported earlier, in the current study British parents are aware that their children have sufficient PA, therefore this awareness may lead them to believe their children have a low level of SB. However, according to research, being physically active does not mean that the level of SB is low. It is possible for someone to be physically active and have a large amount of SB (Marshal et al., 2002; Morgan et al., 2008). The paradox of being physically active and having a high level of SB or vice versa has been reported in some studies (Hovsepian et al., 2016). Thus, it might be, their SB is contributing to their weight status and that this needs to be reduced.

In contrast to British parents' underestimation, surprisingly, Iranian parents overestimated the SB of their children. As stated earlier, studies on parents' awareness of SB of their children are very scarce and most studies on SB have examined parental concern about their children's screen related sedentary (S-RS) behaviour (Cillero & Jago, 2010; Jaballas et al., 2011). Nevertheless, as S-RS behaviours are important contributors to the total SB of children, findings from those studies might help to explain the results of the current studies. Consistent with results of Iranian parents' SB overestimation, a study by Robinson et al., (2006) comparing parents' reports of children's TV–viewing time and the actual time the child watched TV (assessed objectively), found that parents overestimated the time their child spends watching TV by more than four hours per week and this was reported to be related to availability of a TV in the child's bedroom (Robinson et al., 2006). This suggests that parents' estimates of their children's S-RS behaviours are influenced by how much opportunity they have to observe their children engaging in these behaviours. Furthermore, it is also proposed that parents may tend to overestimate their child's television watching as media reports about excess television watching in children has sensitized parents to their child's time spent watching TV (Robinson, 2006).

Thus, one explanation for Iranian parents' overestimation might be related to them being more sensitized to SB, as children in Iran spend less time in school compared to British children (4.5 vs 6 hours respectively for Iranian and British), and thus children spend longer at home. This, along with high levels of Iranian children's S-RS, particularly among middle and high SES groups (our sample is from middle SES) (Hovsepian et al, 2016; Kelishadi et al., 2016), possibly makes parents concerned regarding SB of their children. In addition, being sensitized to the SB of children along with the possibility of not being with children during the day, due to increased rates of working Iranian mothers and full-day working fathers, (Mohammadpour-Ahranjani et al., 2014) might have reduced parents' opportunity to observe their children and resulted in them overestimating their child's SB.

5.6.2.3.2 Children's awareness of their SB

Concerning children's awareness of their own SB, results showed that all British children as well as normal weight Iranian children underestimated their SB while overweight Iranian children are more aware of their own SB. Children underestimating their SB has been found in other studies (Affuso et al., 2011; Grewal, 2013) which reported that this might be related to children's difficulty in recalling the exact time spent in SB or possibility of providing socially desirable answers. Children's awareness of their SB is also important to reduce this unhealthy behaviour and they need to be encouraged to follow a healthy lifestyle, particularly if they are classified as overweight children.

As there is no research on children's awareness of their SBs, the findings regarding Iranian overweight children cannot be compared to any study. One possible explanation might be that as overweight children in Iran were found to be more aware of their weight status compared to British children, this awareness, along with their parents' overestimation of their SB, might have impacted on children's sensitization to their SB, thus leading to their awareness of their SB.

5.6.2.4 Parents and children's awareness of the child's FMS

5.6.2.4.1 Parents awareness of the child's FMS

Regarding parents' and children's FMS awareness, similar findings were obtained in the two countries; parents of normal weight children were accurate in perceiving their child's FMS level (and no significant differences were found between the two countries in their level of accuracy), while parents of overweight children were inaccurate in their FMS perception.

Although there are some limited studies examining the association between parents' perception of the child's FMS level and the child's actual FMS (Liong et al., 2015; O'Neill et al., 2013), none of these studies have examined the accuracy of parents' perception separately in overweight and normal weight groups. For instance in a study on preschool children, O'Neill et al. (2013) found that parents of children who have higher actual movement skills perceive their child's skills to be higher compared to parents of children who have lower actual movement skills. In a study conducted by Liong et al. (2015) parental perceptions of children's movement competency were significantly associated with their child's objective scores from the TGMD–2. Although weight was not considered in those previous studies, the findings that normal weight children in studies 1 and 2 had higher levels of FMS than overweight children are partially consistent with the previous studies. However, the age of the sample size was different (preschool children) in both previous studies compared to the current studies.

In a study by Jones et al. (2010), although parents' perceived competence was compared between normal weight and overweight groups, the accuracy of parents' perceptions was not reported. In their study, they found that parents of overweight children perceive their child to have a lower level of FMS proficiency compared to parents of normal weight children (Jones et al., 2010). In addition, they reported that the difference in parents' perceived competence between overweight and normal weight groups was bigger for older children (11 years old) compared to younger children (9 years old). One reason for this difference was proposed to be related to children's level of progress in their skills as they age and the impact of their weight on that. Thus, for overweight children, as they age, parents become more aware of their PA which is mainly due to increase in body weight and struggling more with loco-motor skills (Bryant et al., 2014; Okely et al 2001; Stodden et al., 2008). Considering the results of the current studies, parents of overweight children being unaware of their child's FMS might be related to them not being aware of their child's failure or success with weight related activities (loco-motor skills) particularly in school.

5.6.2.4.2 Children awareness of their FMS

Considering children's perceived competence, it was found that all children (normal weight and overweight) in the two countries were unaware of their FMS level which is consistent with results of Spessato et al. (2013) as they did not find a significant positive relationship between children's perceived competence and their actual FMS level. Our results are also similar to the results of two other studies that found that the majority of children are unaware of their FMS level through examining the agreement/mismatch between actual FMS and perceived competence (Clark et al., 2016; Pesce et al., 2018). However, none of these studies have examined children's FMS awareness for the two different weight groups as in the present research. Thus, comparing their results with the results of the current studies is not possible.

Evidence shows that children's accurate perception of their FMS is critical for their future PA participation which in turn can impact their healthy weight, highlighting a need to improve children's FMS awareness (Utesch et al, 2018). It is proposed that discordance between children's FMS and perceived competency can be related to various factors such as, peer comparison, lack of self-knowledge, receiving varied feedback, and successful performance and goal achievements/failure in skills related activities, some of which are also related to the age of the child (Harter, 1978, Weiss & Amorose, 2005; Utesch et al., 2018).

Age of children, apart from impacting parents' perception and awareness of their child's FMS level is also considered to impact children's perception and awareness of their physical skills abilities (De Meester et al., 2016a, 2016b; Harter, 1978; Jones et al., 2010; Southsll et al., 2004; Utesch et al., 2018; Weiss & Amorose, 2005).

Research shows that as children age, they become more accurate in their perception of their FMS due to their cognitive development (Harter 1978; Spessato et al., 2012). However, it is also hypothesised that although children in middle and late childhood are able to more accurately assess their own motor competence than children in early childhood, they still tend to overestimate their actual motor competence (Harter, 1999; De Meester et al., 2016a). On the other hand, children's academic year group is reported to significantly affect their FMS skills such that children in higher academic years have developed more FMS mastery than younger children (Bryant et al., 2014). In their study Bryant et al. (2014) found that year 4 children had lower FMS scores than year 5 children in most of their FMS skills (run, hop, gallop, jump, balance, kick, throw and catch).

Therefore, another explanation for not finding a correlation between children's actual FMS and their perception might be related to our samples' different age and year groups (year 4 and 5 in both countries) and its effect on both their actual and perceived competence. It is likely that in the current studies younger year 4 children (age 8-9 years) are less accurate when perceiving their physical competence and might also have different FMS mastery than year 5 (age 9-10 years) children.

Comparing the results of the two countries in study 3, although all children were not aware of their FMS level, it was found that British overweight children overestimated their FMS level more than Iranian children while there was no difference for the normal weight group. There is no cross-cultural study on children's awareness of their FMS level with which to compare the results of the current study. It is reported that various environmental and personal characteristics such as SES, sociocultural factors, an impoverished background and gender, all can impact on overweight children's self-esteem and self-perception of weight (McCullough et al., 2009; Morano et al., 2011; Robinson, 2011). Considering that Iranian children were more aware of their weight issue compared to British children, one explanation might be related to cultural differences and social acceptance of CO (i.e. less normalised in Iran) and self-perception of overweight children between these two countries.

These factors in turn might have impacted on children self-esteem and their perception of their abilities and FMS skills.

The limitations and strengths of the studies (1-3) will be discussed in chapter seven.

5.7 Conclusion

To conclude, the findings of the current studies have demonstrated that British children had higher PA and SB than Iranian children while no significant difference was found between British and Iranian children in their weight status and FMS for both normal weight and overweight children. In both countries overweight children had higher SB and lower FMS than their normal weight counterparts. While no difference was found for PA of British children between weight groups, a significant difference was found for Iranian children, with normal weight children having more PA than overweight children. In both countries many parents of overweight children underestimated their child's weight status, as well as the overweight children themselves, however, misperception was higher among British parents and their children. British parents were aware of PA of their children in both weight groups, while Iranian parents and their children as well as British children in both weight groups overestimated the child's PA. Regarding SB, Iranian parents overestimated their child's SB, while British parents and their children as well as Iranian normal weight children underestimated the child's SB. In contrast Iranian overweight children were aware of their SB. Finally concerning FMS, in both countries parents of normal weight children were aware of their child's FMS level, while parents of overweight children and children in both countries were not aware of the child's FMS level. While comparing two countries in study 3 it was found that British overweight children had higher levels of overestimation than Iranian overweight children.

These results therefore provide further evidence for the need to increase/improve both parents' and children's awareness of weight, PA, SB and FMS in each country through exploring the mechanisms that contribute to their un/awareness. When parents are aware of their child's weight problem, they are more likely to track their child's PA and SB and encourage their children to increase their PA and reduce their SB. As in both countries parents of overweight children were not aware of the FMS level of their children, their accurate perception of their child's SB and PA (in Iran) may improve their awareness of their child's FMS level which might lead to more parental support for improving their child's physical abilities (in particular loco-motor skills). Children's awareness of their weight, health behaviours and FMS are essential for their behaviour change and addressing CO. Thus, intervention programs need to educate children to raise their awareness in this regard.

As parents' accurate awareness and perception of weight status and health behaviours of their children impact on and form children's health behaviours as well as their self-awareness, examining underlying factors affecting parents' un/awareness is important. This will help inform future preventative initiatives to target the increasing levels of CO, and in turn adolescent and adulthood obesity rates and SB in each country. This would also enable one to begin to examine the extent to which parents' and children's perceptions are universal or culture-specific and may help contribute to understanding the mechanisms of accurate perception and misperception, which might, in turn, be beneficial for designing cultural-related intervention programs worldwide.

Therefore, there is a need to more deeply examine what affects parents' awareness of those factors qualitatively in both countries.

Chapter six

Study 4

A qualitative analysis of perceptions of childhood obesity (CO), physical activity (PA), sedentary behaviours (SB)/inactivity, and fundamental movement skills (FMS) of children among British and Iranian parents.

6.1 Abstract

Objectives: Although parents' awareness of their child's weight and health behaviours such as PA, SB and FMS are important for behaviour change, research shows lack of awareness. Considering that there is some lack of knowledge of and insights into the underlying factors that affect parents' awareness of those factors in different cultures, this study examines British and Iranian parents' perceptions and views towards obesity, PA, SB, and FMS of children through in-depth interviews with parents.

Methods: A qualitative study using semi-structured, face-to-face interview was designed. Interviews were recorded, transcribed and analysed thematically. Participants interviewed were 40 parents (20 British and 20 Iranian) who had an 8-10 year old child and were fluent in their respective native languages namely English and Farsi. Of the

parents, 33 were mothers (16 British and 17 Iranian) and 7 were fathers (4 British and 3 Iranian). Nearly one quarter of participants reported they had an overweight child.

Results: The results showed that overall British parents attributed the responsibility of CO and inactivity of children mainly to parents, while Iranian parents shared the responsibility with school and government. In both countries, parents' denial was considered to be a reaction to CO and low levels of activity and FMS that may result in misperceptions. Reasons for denial include parents deflecting responsibility (mainly in the UK), avoiding social stigma attached to obesity (mainly in Iran) and normalisation of CO (mainly in the UK), as well as parents' 'love blindness' and tendency to be positive about their children. However, regarding SB, while British parents' denial may be a reaction to high SB of children, some Iranian parents overestimate their child's SB to encourage them to be more active, avoid labelling such as hyperactivity, as well as to seek more support from school and government for reducing SB of children. Nonchalant and positive attitudes towards CO were suggested to be another underlying factor for parents' weight misperception due to them believing that obese children will grow out of it, or overweight children are considered to be healthy and attractive.

Parents' lack of knowledge was considered a key barrier to parents' accurate perception of their child's weight, PA, SB and FMS. Lack of knowledge about contributors to CO, including nutritional knowledge and being able to identify overweight children may serve as underlying factors for parents' weight misperception in both countries. Similarly, lack of knowledge of PA, SB and FMS, including identifying an in/active child or a child with well/poorly developed skills, as well as not observing/monitoring these behaviours in children was thought to impact parents' awareness of these behaviours in both countries. Other perceived barriers such as time, cost, convenience as well as child related factors such as preference for unhealthy behaviours and peer pressure were also found to prevent behaviour change.

Conclusion: Various underlying factors influence parents' awareness of their child's weight, SB, PA and FMS. Some factors may be culturally related, while others were universal. This suggests that intervention programs for preventing and managing CO as well as improving healthy behaviours of children need to be culturally specific.

6.2 Introduction

The results from the quantitative studies (study 1 and 2) showed that many parents of overweight children are unable to accurately perceive their child's weight status, Physical Activity (PA; except for British parents), Sedentary Behaviour (SB), and Fundamental Movement Skills (FMS). In order to improve parents' awareness and recognition, first it is essential to understand the reasons for their misperception/unawareness and what underlying factors influence this (Jones et al., 2011; Spargo & Mellis, 2014). It is evident that qualitative studies are potent to provide new insights and enhance the understanding of a topic (Jones et al., 2009; Staniford et al., 2011) through exploring peoples' values, perceptions, and attitudes (Jago et al., 2012; Mackintosh et al., 2011). Thus, qualitative studies on parents' views, perceptions, and knowledge toward obesity, SB, PA, and FMS skills of children, might help to better understand the mechanisms of their awareness.

Considering the results of study 3, suggesting there are some differences between parents' awareness in the two countries, exploring similarities/differences in underlying factors that impact parents' awareness in these two cultures through a qualitative study may help professionals to develop culturally appropriate programs for promoting activity levels of children as well as the management and prevention of CO (Knowles et al., 2015; Mejia de Grubb et al. 2018; Trigwell et al., 2015).

6.3 Rationale for qualitative research on parents' perceptions of CO

Besides the large amount of quantitative research on parents' perception of their child's weight status, the underlying mechanisms of parents' misperception have not been explored deeply (Eli et al., 2014; Hudson et al., 2012). Nevertheless, the limited qualitative studies have shown that parental perceptions and views towards obesity and related factors impact their awareness of their child's weight and health status. These factors can be the definition of obesity, methods to identify obesity, contributors to obesity, parents' perception of the health status of children, understanding the health problems caused by obesity, and cultural acceptance of obesity (De La O et al., 2009; Eli et al., 2014; Etelson, et al., 2003; Jain et al., 2001; Jones et al., 2011; Rich et al., 2005).

Parents' unawareness of the clinical references/methods to identify obesity is reported as an underlying factor for parents' misperception of their child's weight. Studies by Eli et al. (2014) and Rich et al. (2005) found that while parents of overweight children were aware of growth chart percentiles, they don't have the knowledge on interpreting them. Jain et al. (2001) and Jones et al. (2011) also found that instead of using clinical methods, parents use visual and behavioural signs, such as a child's PS level, clothing size, or comparing children with extreme cases, as well as whether a child is socially accepted by peers or society as ways of identifying obesity.

Denial is reported as another underlying factor for parents' misperception which is proposed to be caused through some psychological mechanisms (Jackson et al., 2007; Pagnini et al. 2007; Southwell & Fox, 2011). The negativity of the term “obesity” and avoiding social stigma is a reason for parents' denial. Parents' fear of being negatively evaluated by others as well as blaming themselves for their child's weight problem and their responsibility are also reported to cause parental denial of CO (Crandall et al., 2001; Regber et al., 2013; Southwell & Fox, 2011). Parents' level of control over their child's weight, diet, PA, and their support are considered to be the factors that influence their denial (Southwell & Fox, 2011). For instance, Eli et al. (2014) found that in their study, although parents considered genetics as a contributor to CO, they believe parents are mainly responsible for the issue and attributed obesity to “lazy” parenting. However, in the study by Jain et al. (2001) many parents believed that obesity was influenced by genetics, and that it is unavoidable (Jain et al., 2001). Therefore, as it stands the attribution of responsibility for CO to external or internal causes may lead to denial or acceptance of CO. To further investigate the mechanisms of psychological factors on parent's' denial of their child's weight problem qualitative studies are needed. Furthermore, considering that in individualist cultures the blame and responsibility of obesity is on the person/ parents compared to collectivist cultures, examining these mechanisms between different cultures is needed (Braley, 2016; Crandall et al., 2001; Wolfson et al., 2015).

Cultural background, perceptions and values are reported to influence parents' misperception of their child's weight status through different ways (Aparício et al., 2013; Gualdi-Russo, 2012; Hochdorn et al., 2018; Huang et al., 2007; Towns & D'Auria 2009). For instance, a study on Hispanic parents' perception of their obese child's weight showed, mothers were more concerned about their child's weight than fathers. Also, fathers were only concerned about their girls' weight problem and believed boys outgrow obesity (Mejia de Grubb et al., 2018). However, Eli et al. (2014) in their study on Caucasian parents in the USA, did not find differences between mothers' and fathers' perception of their child's weight.

Regarding weight preferences, in some cultures (Western countries), slimness represents beauty (Hochdorn et al., 2018; Kelishadi et al., 2013; Marks, 2015). In other countries/cultures (e.g. African-American/Asian) heavier children are considered healthy, cute or more appealing, and thus chubby child is accepted as a norm (Aparício et al., 2013; Chan, & Wang, 2013; He & Evans, 2007; Jain et al., 2001; Park, 2017). In Iran, this notion has been suggested to be a potential reason for parents' misperception of their child's weight (Kelishadi, 2007). However, results of study 3 showed that Iranian parents are more aware of their child's weight problem than British parents. In addition, a chubby child being "cute" and "healthy" has also been reported among Caucasian parents (in the USA) who believed obesity is problematic only in late childhood and adulthood (Eli et al., 2014). Therefore, a cross-cultural qualitative study is needed to deeply examine the mechanisms of parents' misperception in these two cultures.

6.4 Rationale for qualitative research on parents' perceptions of PA, SB and FMS of children

There are limited studies (qualitative or quantitative) that examine parents' awareness of PA, SB, and FMS among children. Regarding parents' perception of children's PA, qualitative studies have highlighted that parents rely on visual signs to assess their child's PA (Bently et al., 2012; Noonan et al., 2017; Pulakka et al., 2014). Visual signs, such as a child's weight, level of energy, and time spent on screen related devices, ability to quickly learn new skills, such as motor were recognized as some indicators that parents use to identify an active child. Attributing weight status of children to their PA level was also highlighted in some quantitative studies as a factor that influences parents' assessment of their child's PA level; so that slim children were considered to have a high level of PA while overweight children were assumed to have a low level (Corder et al., 2010; Eckstein et al., 2006). However, the findings of the quantitative studies in the previous chapter (chapter five) did not support the association between weight status and parent's perception of PA of children.

Parental monitoring and supervision are also reported as potential factors affecting parents' awareness of children's activity level, including both SB and PA (Grewal, 2013; Hedwig, 2009). Regarding SB, Grewal (2013) in their study found that the majority of parents underestimate their children's SB which is consistent with results of study 1 in the UK. However, these results are in contrast with the results of study 2 in Iran that showed Iranian parents overestimated their child's SB. Regarding overestimation of SB, not having the chance to observe children's engagement in SB (TV watch) and parents' concern over their children's TV watching time is reported (respectively by Robinson et al., 2006 and Pearson et al., 2011) to lead to parent's' overestimation of the time their children watch TV. However, the accuracy of the reported time by parents was not determined in these studies. In addition, only TV watching is one type of SB, and thus further investigation of overall SB is needed in both countries.

Culture is reported to affect parents' perceptions, attitudes, and support of children's PA, which, subsequently, impacts PA levels of children (Kumanyika, 2008; Trigwell et al., 2015). Qualitative studies show that cultural beliefs can be a barrier to PA participation. For example, Middle-Eastern parents place an emphasis on education and academic success over PA (Dwyer et al., 2008; Trigwell et al., 2015). Similarly, some studies show that culture affects parents' perception of the child's SB, barriers to SB, as well as rules for TV-viewing (Cillero & Jago, 2010). A study by Knowles et al. (2015) on parents' perception of overall SB of children in the UK found that the weather is considered as an important contributor to SB of British children, while in Granich and colleagues' (2010) conceptual schema of contributory factors to SB in Australia parents did not mention that, which might be related to the different weather condition in this country. It was also found that socio-cultural norms influence the use of electronic media among older children. It is suggested that cultural and contextual norms associated with SB need to be examined as this might be beneficial for designing culturally appropriate obesity prevention programs (Knowles et al, 2015).

Ethnic/cultural differences, was examined in a study by Eyre et al (2014), on parents' perception of environmental factors influencing activity level of children. The study was conducted in a low socio economic area in UK (i.e. England). Various environmental factors (e.g. poor access, safety and quality of the neighbourhood etc.) was perceived by parents that can reduce PA and in turn increase SB of children. This study however, did not find ethnic differences in parents' perception which might be related to the study being conducted in same country and hence the environmental differences between countries not being taken into account. Thus running such studies in two different countries with diverse culture is needed as they may provide different findings.

Regarding FMS, to the best of our knowledge, there is only one study on parents' perception of improving PA and FMS skills in children. In this study that was conducted in the UK by Roscoe et al. (2017) they found that parents had good knowledge on FMS. However, in their study there is no information on whether parents are able to realise good/poor developed skills of children. No study is available on parents' FMS perception in different cultures.

In the literature reviewed above, besides the lack of in-depth qualitative studies on factors that particularly affect parents' awareness of their SB, PA, and FMS, there is also a lack of cross-cultural qualitative studies on the topics. The studies reviewed have predominantly been conducted in western countries which limits the generalisability of the results to other cultures and populations (Bentley et al., 2012; 2015; Eli et al., 2014; Jain et al., 2001; Jones et al., 2011; Noonan et al., 2017; Rich et al., 2005; Roscoe et al., 2017). Considering the differences found between British and Iranian parents in their perceptions, conducting qualitative studies in these countries might help explain these differences.

Therefore, there is a need for a cross-cultural qualitative study on this topic to examine parents' views and perceptions of obesity, and related health behaviours of children. Another reason this is needed is the lack of knowledge of and insights into the underlying factors that affect parents' awareness of weight status, PA, SB, and FMS of children in different cultures. Furthermore, qualitative studies have not looked at all of these variables together in a single study. Therefore, this study will be an in-depth qualitative cross-cultural study on British and Iranian parents' perceptions and views on obesity, PA, SB, and FMS of children.

6.5 Aim of the study

The aim of this study is to explore the underlying factors that may contribute to British and Iranian parents'/ children's accurate /inaccurate perception of children's weight status, PA, SB and FMS.

The objective of the study is to deeply examine and compare British and Iranian parents' perceptions and attitudes toward CO, PA, SB, and FMS of children through interviewing parents in both countries.

6.6 Methodology

6.6.1 Design

A qualitative study, consisting of semi-structured interviews was designed. A qualitative approach was chosen as this approach provides in-depth insight into the topic. Interviews were chosen as they can elicit participants' personal feelings, opinions and experiences, as they feel more relaxed to express their opinion compared to focus groups (Kairuz et al., 2007). Ethical approval for the research was received from Middlesex University, London Sport Institute Ethics sub-committee (Appendix A).

6.6.2 Participants

There were 40 parents interviewed, with 20 from the UK and 20 from Iran. Out of these participants, 33 were mothers (16 from the UK and 17 from Iran) and 7 were fathers (4 from the UK and 3 from Iran). The inclusion criteria included having a child aged 8-10, as well as being a fluent speaker of their respective native languages (English in the UK and of

Farsi in Iran). From parents' reports, nearly a quarter of parents in both countries had an overweight /obese child. More parents' characteristics are provided in the results section.

6.6.3 Procedure

All parents were initially contacted in two ways: firstly, through schools and secondly, on an individual basis. Following permission from schools to conduct individual interviews, parents were given an information sheet (Appendix E). The schools sent these letters home to parents. Parents were asked to sign the consent form and return it to the school office, if they were interested in taking part in the study. Subsequently, schools informed the researcher if they had received any consent forms from those who wanted to participate. Afterwards, the researcher contacted participants, through the details provided to arrange a time and place for the interview. Only two schools in North London agreed to take part in assisting with recruitment, so, in order to increase participant numbers, the researcher expanded this participant base through face-to-face contact at the school gates, at children's centres or clubs, as well as through the University. In Iran, participants were sourced in a similar way. They were recruited from schools, children's/community centres and by the local University, who promoted the study. Those who were interested, were given an information sheet and consent form with a date for an interview. On the day before the interview, participants were given a brief verbal summary of the research and any questions they had were answered. The consent forms included children's and parents' details (i.e., children's height and weight) which were checked with participants (appendix E). Interviews were conducted in a quiet space, lasting between 20-40 minutes. These were digitally recorded and transcribed verbatim.

It should be noted that although some of the schools had already participated in the quantitative studies, none of the participants in this study were people who already had participated in those studies.

6.7 Materials

6.7.1 Interviews

A semi-structured interview schedule, consisting of three parts, was used to promote the interviews. The questions were developed based on the study aims and the relevant literature. The interview questions then were piloted with two parents which led to review and refining of the questions (e.g. sequencing of sentences).Thus, interviews started with general questions on CO and parents' knowledge of factors contributing to this issue. Also, they were asked their opinion on why some parents misperceive their child's weight. The second part focused on parents' knowledge of the influence of inactivity on children's health. They were asked their opinion on how to reduce children's inactivity and why some parents are not aware of their child's sedentary time. The final part was about parents' knowledge of PA and FMS. Their thoughts on the importance of PA and FMS skills and why some parents cannot recognise their child's actual PA and FMS was examined (Appendix E). Although all participants answered the same questions, the order of questions differed depending on the interviewees' responses. It should be noted that the interviewer in both countries, was the first researcher, who is fluent in both English and Farsi.

6.7.2 Data analysis

All the audio recorded interviews were transcribed verbatim. The qualitative data analysis computer software program NVIVO was used and thematic analysis (Braun & Clarke, 2006; 2012) was conducted.

Thematic analysis has been used widely in psychology as it is accessible, and flexible to be used with various research questions and topics (Braun & Clarke, 2006; 2012). In addition, by using this method potential bias or assumptions made by researcher through the process of data collection and analysis decreases. Thematic analysis is a systematic way of coding and analysing the data which enables the researcher to identify patterns of meaning, which are called themes, across the data set and then organise and categorise the emerged themes. To assess data, thematically, across questions and to identify themes in this study, an inductive approach was used. An inductive approach is a bottom-up approach in which the codes and themes are driven from the content of data (Braun & Clarke, 2006; 2012). In addition, a "contextualist" approach was adopted. This focuses on the reality and experiences of participants but also the way they make meaning of their experience, including how the broader social context impacts on those meanings.

For the purpose of this study, Braun and Clarke's six-stage process was applied to conduct the thematic analysis. In the first step (familiarising yourself with the data), the author initially immersed herself into the data, by actively listening to the audios and reading and re-reading the transcripts in detail. In step two (generating initial codes), participants' responses were independently coded, to provide a summary of the data content. By applying step 3 (searching for themes), the final codes were combined together with respect to their similarity and uniformity and shifted to sub-themes that were related to the research aims. Afterwards, the sub-themes were organized into themes. In step 4 (reviewing the themes), the transcripts were re-read to ensure that codes and themes were related to the research aims and did not overlap. Also, it was checked if themes have internal homogeneity and external heterogeneity, which means the themes cohere together meaningfully, while there is a clear distinction between them (Patton, 1990). In step 5 (defining and naming themes), the themes were given final names. In the last step (step 6: producing the report), some of the quotes from participants' responses were chosen to represent/illustrate the themes. To avoid bias and ensure rigour of the analysis throughout the process, the interpretation of data, codes, sub-themes and final themes were reviewed and discussed by the second researcher until consensus was reached. In addition, prior to the interviews, the interviewer (first researcher) was trained by a member of research team who was an expert in qualitative research, to enhance the credibility of the results (Patton, 1999).When the saturation was reached, interviews were stopped (Patton, 2002).

It should be noted that to protect participants' identities, they were given pseudonyms.

6.8 Results

Descriptive statistics of the parents interviewed in both countries are provided in table 18. The samples in the two countries were homogenous in terms of their education (the majority had a university degree), gender (mainly female), age and number of children. In both the countries the majority of parents had two or more children (ranging from one to three children), with an age range of 10 months to 23 years. Although parents were not specifically asked about their perception of their child's weight, during the interviews nearly a quarter reported their child as overweight. Thus quotes from parents of overweight children throughout the text only refer to those who voluntarily acknowledged their child had a weight issue, but it is not known how many parents actually had an overweight child.

Table18. Parents' characteristics In UK and Iran

	UK (20)	Iran (20)
Age (mean)	41.8	40.9
Gender		
Female	16	17
Male	4	3
Number of children		
One child	5	4
Two or more children	15	16
Education		
High school degree	7	6
University degree	13	14

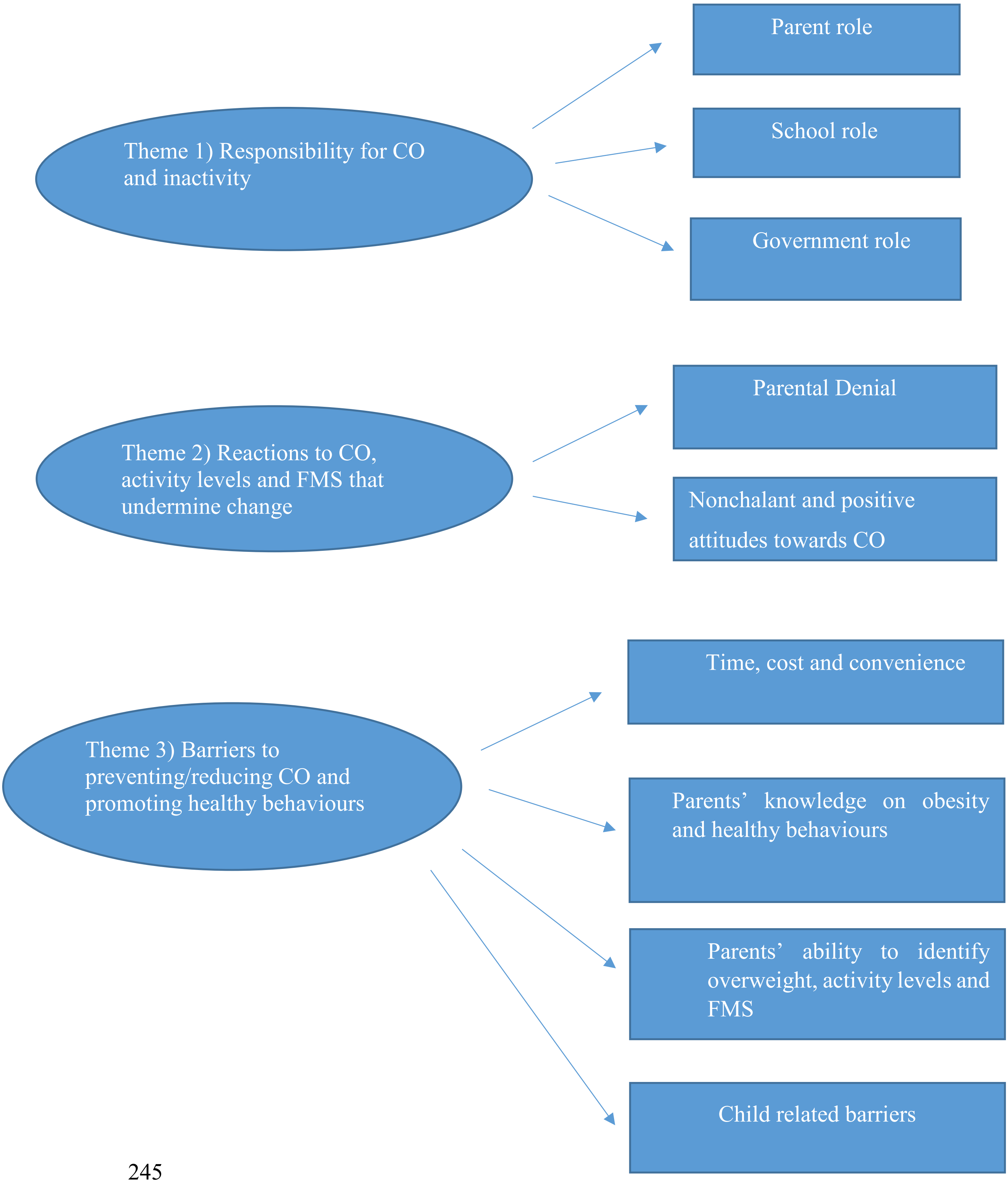
6.8.1 Emerged Themes

As shown in table 19, the analysis yielded three major themes; "responsibility for CO and inactivity", "reactions to CO, activity levels and FMS that undermine change", and "Barriers to Preventing/reducing CO and Promoting Healthy Behaviours, PA and FMS". Each theme contains sub-themes which are explained in the following sections. Thematic map is also provided (see figure 2).

Table19. The identified themes and corresponding subthemes in UK and Iran

Themes	Sub-themes
Theme1: Responsibility for CO and inactivity	• Parent role • School role • Government role
Theme2: Reactions to CO, activity levels and FMS that undermine change	• Parental Denial • Nonchalant and positive attitudes towards CO
Theme3: Barriers to preventing/reducing CO and promoting healthy behaviours	• Time, cost and convenience • Parents' knowledge on obesity and healthy behaviours • Parents' ability to identify overweight, activity levels and FMS • Child related barriers

Figure 2. Thematic map showing final three themes and corresponding subthemes in both countries.



6.8.2 Theme 1: Responsibility for CO and inactivity

Parents in both countries believe that inactive lifestyle, technology and children's diet are primary contributors to obesity in children. Parents, school and government were considered as contributors to CO and inactivity of children through their influence on children's behaviours. Thus, "parent role", "school role" and "government role" emerged as sub-themes. In addition, attribution of the responsibility of CO and inactivity will be discussed.

6.8.2.1 Sub-theme1: Parent role

Data showed that most participants place great importance on parents' roles for weight and health behaviours of children. Almost all parents attributed the main responsibility for obesity in children to their parents, as they are seen to have control over children's diet, PA levels and SB. The quote below describes this:

"I personally think parents are responsible for overweight of children, ...while children are small it is the parents who are providing the food, buying their food making them do exercise, or letting them sitting in front of Xbox for hours and it is parents controlling that side of things." (Anna, UK , ID4)

"I think parents are the main reason of blame, because it is parents who don't consider children's healthy nutrition and activity level" (Ziba, IR , ID30)

Apart from blaming other parents, some parents commented in a more personal way, referring to their personal responsibility and parenting style.

"I do think it's [obesity in children] due to the parenting style so I think it's the parents' responsibility yeah if my child ends up overweight it is of course my fault." (Marry, UK , ID14)

Self-blaming and feeling guilty for low levels of PA of children was also mentioned by some parents, as they believe it is parents' responsibility to promote PA. The quote below is from a mother who believed her child to be overweight.

"I feel bad that she's not out it is my responsibility to make her active. I feel guilty if we don't do very much on the weekend I feel like she should be out and about especially when the weather's good but we do any way on that even in the winter I have to take her out." (Jullia, UK, ID10)

Teaching healthy habits to children from early ages was highlighted by some parents as an important part of parents' responsibility. This was considered a critical factor for fostering future healthy lifestyles and forming children's healthy attitudes.

"I believe parents are responsible to educate their children from early ages to eat healthy food and to exercise in order for this behaviour to become their habits ,then children grow up with a healthy attitude and when they get older they follow a healthy lifestyle." (Azadeh, IR , ID31)

Some also believe that just educating children is not enough and parents should act as good role models themselves, as a combination of these behaviours is more beneficial for promoting children's healthy behaviours. One mother noted:

"I think a combination of being healthy role models and having healthy lifestyle along with educating children about healthy behaviours works better than just educating children and telling them don't eat this or that. If you don't want your kids to eat junk food don't have it at home and educate children these stuff are unhealthy." (Sahar, IR , ID38)

The importance of being good role models for promoting children's healthy eating and activity patterns was mentioned by the majority of parents in both countries.

"children learn from parents if you be healthy like eat healthy and be active, children learn from you so I think the most important thing is that parents try to follow healthy lifestyle, start by cooking more healthy food or do every day walking with children, then children learn it gradually and it becomes their habits." (Fariba, IR , ID36)

Some parents blamed other parents for acting as unhealthy role models. The following quote illustrates this:

"it always makes me really sad when I see overweight children and overweight parents heading into McDonald's having sort of unhealthy lifestyles it's really sad because the children are following their parents…if you have an inactive parents that can reflect on you because the parents would be quite happy to just be indoor in front of the screen whether it's a computer or TV which is not a good role model." (Neli, UK, ID 17)

Many parents in both countries believed that parents' unhealthy practices and strategies in regard to children's diet, PA and SB will contribute to CO. Regarding children's nutrition, parents named factors such as children's access to junk food at home, being allowed to eat too much junk food, eating in front of the TV/screen or in their bedroom as well as consumption of fizzy and sweet drinks to be important contributors that need parents' control. One father noted:

"We don't generally buy soft drinks, it's okay occasionally we buy crisps, but the kids don't look for it as we don't bring much to the house. When you don't buy it children don't know it and don't look for it . We don't go to McDonalds or eat at fast food restaurants, the only thing that we buy may be KFC other than that we don't. I think the families that end up obese eat a lot of junk food and watch a lot of television and eat foods. We don't allow kids eat in their bedrooms or watch TV while they are eating their food." (George, UK , ID1)

Some parents criticized other parents for their unhealthy strategies as they believe these strategies will shape children's future unhealthy behaviours and hence contribute to their weight. Feeding children in front of the TV was highly reported and seen as a particular problem. For example, a mother who perceived her child to be overweight noted:

"I believe one important contributor is eating in front of TV which is learnt through the parents, as they want to keep children calm they feed children in front of TV, then it becomes children's habit and they don't know how much food they eat while on TV, I mean they eat more in front of TV." (Nazanin, IR , ID37)

Not setting rules on consumption of unhealthy snack foods was also criticized by some parents. Anna who believes she has a strict parenting style indicated:

"I and a lot of my friends are very strict but if I am talking broadly in the UK I think there are a lot of families that don't understand the consequences of giving their children squash with every meal and crisps and snacks…..I don't understand why parents don't limit their sweet intake, it would appear that a lot of parents don't install rules that come to sweets and things like that." (Anna, UK, ID4)

Furthermore, some parents criticised parents of overweight children for their contradictory strategies regarding children's nutrition and diet.

"I know some people with overweight children that they have too much unhealthy snacks at home, so when children know it is available to them want to have it, on one hand they provide unhealthy snacks at home on another hand they provide their child with diet to lose weight." (Sahar, IR, ID 38)

Another common unhealthy strategy that most parents criticised in both countries was treating children with unhealthy snacks as rewards.

"I know a lot of the time many parents tell them if you're good I give you an ice cream or chocolate so give them an unhealthy snack as reward is not good and can encourage them to eat unhealthy snack even more." (Azadeh, IR , ID31)

It was suggested that parents should instead try to treat children with a healthy snack like fruit as it is a good strategy to make children used to healthy snacks.

"Bringing them fruits like apples as treats and stop giving them unhealthy foods like cakes and chocolate and prepare healthy snacks like sandwiches instead and they get used to it." (Jennifer, UK, ID8)

Parents' role and strategies regarding activity levels of children was highlighted as an important factor to reduce inactivity of children and to prevent CO. Parents in both countries strongly believed children are leading sedentary lifestyles, and that technology is the most significant contributor to inactivity of children. Participants in both countries described how screen-related behaviours such as watching TV, playing video games, and spending time on the computer and mobile phone at home play an important role in inactivity of children. For example, Jullia describes her observations with her daughter regarding screen time and SB as follows:

"it *is the lifestyle, children these days are on the computer all the time and you know they don't move I see it in my own daughter she doesn't move for 2 hours if she's on screen." (Jullia, UK , ID10)*

Many Iranian parents felt this was difficult to control because living in apartment blocks was a contributor to children's use of electronic devices and their inactivity.

"These days most people live in apartments so it is not possible for children to be active while at home and they sit in front of TV or play electronic games, so we can't do anything." (Fariba, IR , ID36)

However, some parents blamed other parents for not limiting the screen time of their children as they believe setting rules on screen related devices is a key factor in reducing inactivity of children.

"I believe it is parents responsibility to limit their children screen related times, for example playing one hour of video games then doing some activity, I don't let my son to play computer games or Xbox more than one hour, it is our rule ,if he wants to play more, he needs to be more active." (Ziba, IR , ID30)

Some parents also criticized other parents for using electronic devices to keep their children quiet and calm as they believe this reduces activity levels of children.

"*Because of the development of the gadgets in the new technology children are less active and some parents don't care because that's how they keep them busy" (Lena, UK , ID15).*

In particular, some highlighted that prioritization of electronic devices over PA of children has consequences for FMS and abilities as well as general mobility.

"children nowadays watch tv and play with mobile phones, they have strong fingers to press the button and play computer games but they don't

have the grip to climb from a tree or across monkey bar, that's because they never been asked to climb something that's because the parents not allowing them. Nowadays children only go home watch TV or playing their game consoles. It is really frightening children as young as 5 are now going to physiotherapy to help them not because something's wrong not because had an accident is just because they haven't done anything all their life." (Natasha, UK , ID12)

Some parents also believe that in order to increase activity levels of children, parents need to spend time with them and criticized other parents for not doing so. For example, a father who felt his child was overweight indicated:

"Parents are responsible to increase their child activity level, they have to pay attention to their child's PA and it is not like just providing equipment for them, you can't just buy bicycle and then expect your children to play themselves. Parents need to spend time with children to increase their activity." (Ali, IR , ID27)

Aside from the negative influence of screen time on activity levels, a factor that was only cited by Iranian parents was the influence of parental emphasis on academic success. It was reported that educational and academic achievement is very important for parents so that it has priority over children's PA and weight problems. Parents proposed this will encourage children's inactivity and overeating.

"one reason (for CO) is that parents are focusing too much on children's educational success thus want their children to study hard, I know some people who have overweight and obese children but they don't care about

the importance of PA for their child, they just want their children to do good at their lesson, they want their children just to sit and study and then they (parents) overfeed them and think it is good, while it is unhealthy and make them to put extra weight." (Ziba, IR , ID30)

Overall, in both countries diet, low levels of PA and technology were considered as important contributors to CO, and parents were considered to be primarily responsible for this through their practices, strategies and parenting styles such as not educating their children about healthy behaviours, poor role modelling, using junk food as a reward and allowing too much screen time. Some made suggestions on how to promote healthy behaviours of children and prevent CO such as good role modelling, spending more time with children, and healthy snacks as treats. However, Iranian parents felt that emphasis on academic success posed a dilemma in terms of their responsibility for prioritising healthy behaviours versus academic success.

6.8.2.2 Sub-theme 2: School role

Data in both countries revealed that school was considered to have a secondary role in obesity and PA in children to that of the role of parents. However, the extent to which school was responsible was considered differently in each country. For instance, Iranian parents mostly viewed school as a negative environment that plays a critical role in contributing to CO and inactivity, while only a minority of British parents believed school is a contributor to CO. Some Iranian parents believe that school is sabotaging their effort to raise healthy children.

"I think schools responsibility is not less than parents, these days schools are important contributors to obesity of children, you know availability of too much unhealthy snacks at school's canteen along with being very inactive in school is a big problem, children spend half of their day in school so whatever we as parents do to bring them up healthy is going to be destroyed by school." (Fatemeh, IR , ID40)

In the UK the school day is mostly from 9am to 3:30pm (6.5 hours) while in Iran it is normally from 8am to 12:30 pm (4.5 hours), so in Iran (unlike in the UK), children don't eat lunch in school, although there is a canteen available in each school that sells some snacks during break times. Iranian parents complained about the availability of unhealthy snacks in the school canteen which children manage to eat even if parents try to prevent it by providing them with healthy snacks or not giving them money.

"Even if I don't give money to my son to buy these stuff he borrows money from his friends or sometimes from his teachers to buy them, so I have to give him money. I think since these canteens are available and continue selling unhealthy snacks and food our effort is useless." (Mina, IR , ID33).

In the UK however, most UK parents believe school dinner is healthy most of the time, and that schools care about children's food while trying to have healthier food compared to the past. For example, Gabby stated *"I think (school dinner) is good and very healthy I always get school dinner for my children" (Gabby, UK, ID13).* Many parents believed that the school menu is available for parents and hence it is parents' responsibility to check the menu and alternatively provide a healthy pack lunch for their children. Lena indicated*: "they have menu so we can choose if it is not healthy we can give them pack lunch. So I don't have a* *problem with them." (Lena, UK , ID15).* However, some British parents also suggested that the school still needs to improve the quality of food and make fresh fruits and vegetables more readily available to encourage children to eat healthily. Removing the desert from school meals was also suggested by some parents in order to reduce the sugar consumption of children. *"I think schools should provide more healthy food and cut down the cakes and chips and stuff and it's getting more like salads and more healthy foods." (William, UK , ID5)*

Regarding activity levels of children in school and the role of school, there appeared to be disparity between parents' perceptions in the two countries. Iranian parents believe that school is a key contributor to inactivity of children, after electronic devices, while British parents perceived greater satisfaction with the school's role. Although parents from both countries share some concerns, in the UK most parents believe that school is doing well in regard to PA of children and believe PA time is adequate in schools, and children are active enough during school time. George noted: "*I think schools are playing a good part in it as they are taking them to compete in racing, running and tracks, and other activities" (George, UK, ID1).* They also appreciate where schools offer a variety of sports and activities and this was seen as important. For example, Anna indicated: *"schools seem to be really good at offering a variety of activities" (Anna, UK, ID4).*

In contrast, Iranian parents largely believe schools encourage children's inactivity by either low levels of activity at school or prioritising academic achievements, which also demands children spend long periods of time on their homework.

"In my opinion technology and school are important contributors to inactivity of children, when at school they sit a lot and don't have too much activity, even break times many of students sit and have their snacks, as soon as they get home they are on screen either TV or electronic games, or siting and doing their homework." (Ali, IR , ID27)

A common trend was seen that Iranian parents believe primary schools do not value the PE lessons and this subject is treated as the least important subject in comparison to academic achievement. The quote below is from Nazanin who believed her son to be overweight:

"They (schools) just focus on their lesson, PE is not considered as an important subject, whenever they need extra time for maths or other subjects they replace PE with that." (Nazanin,IR , ID37)

Almost all Iranian parents complained about inadequate PE time and poor delivery of PE. Most parents criticized PE teachers for not paying attention to PE as an important subject.

"I have seen PE teacher brings the balls and give it to children and put them in different groups then go and sit somewhere and just watch them it is not like teaching them any skills, PE teachers are more concern about health and safety of pupils, for half of the time children play and then they do whatever they want, some of them sit and watch others some even eat their snacks so I think they should change their method to make PE time more beneficial." (Ziba, IR , ID30)

Having the class teacher run PE and not allocating a specialised PE teacher to run the subject in primary schools was criticised by some

Iranian parents (whereas lack of specialised PE teachers was mentioned only by one British mother). This was mentioned by an Iranian father to prevent the improvement of children's FMS and sport skills and thus PE in primary schools was perceived as failing to be educational.

"It is ridiculous many primary schools don't even have PE teacher and the class teacher runs the PE subject which I don't think is beneficial for children in terms of improving their FMS skills, it is just like giving them some equipment and ask them to play themselves because class teachers, they are not educated in this regard." (Hamid, IR, ID39)

Lack of enough space in school yards for PE due to schools becoming small or crowded was reported to reduce activity levels of Iranian children. In addition, factors such as weather conditions, other classes having an exam or the sickness absence of the PE teacher were mentioned to be reasons for PE to be commonly replaced with brain games inside the classroom. This was cited only by Iranian parents.

"PE is the least important subject in school, they don't really care about it, some schools don't even have space for PE so they have to take children somewhere else which is time consuming and need financial support while some schools are struggling with it. Even sometimes due to weather condition children stay in classroom and play brain games this is what I hear from my daughter a lot while school do not inform us." (Neda, IR , ID23)

Moreover, some Iranian parents highlighted health and safety in school as a challenge for school staff so that in most schools, children are not permitted to play in school yards during break times (whereas this was not proposed to prevent British children from being active in school).

" nowadays even break times children are not allowed to play around the school yard due to health and safety of children, if something happens to children then parent blame school' authorities, it seems that break time is for children to eat their snacks." (Nazanin, IR , ID37)

In addition to low levels of activity inside the school, Iranian parents complained about the amount of homework that is set by school. Iranian parents expressed how this contributes to inactivity and obesity because children have to be inactive at home while completing their homework for long periods of time. However, it should also be noted (as discussed under the previous sub-theme) that some Iranian parents may themselves prioritise academic success, so they may encourage long periods of study at home.

"I don't understand why school gives them too much thing to do at home, they have too much homework to do then they need to read and study for long time to get ready for next day's lessons, you know even if they want to be active after school they have to sit and do their homework which make them inactive as well and contribute to overweight and obesity." (Elham, IR , ID22)

In contrast to the negative impact of homework on activity levels reported by Iranian parents (which was not an issue raised by British parents), British parents reported that after school clubs are beneficial for promoting children's PA, although they are not free of charge. There are no such clubs in Iran and the majority of Iranian parents believe schools should provide low cost after school sports clubs to increase activity of children and help parents overcome barriers such as time, cost and transportation.

"I think schools should have some after school clubs like sport and physical activity classes with affordable prices. schools close after around 1 o'clock till the next day, why not use it for after school activities and increasing activity of children. I think many families would be happy with this as they don't need to take their children out for sport classes, sometimes you have to travel a long distance for some classes which demands time, and also transportation." (Soheyla, IR, ID31)

In addition, most Iranian participants indicated that travel to school also impacts children's activity levels. More than half of Iranian parents noted that children being driven to school either by a parent or the school's bus has become a common trend (this was not raised by British parents).

"One factor that contribute to inactivity of children is that they don't walk to the school anymore, these days most children use school bus to get to the school as parent are concern regarding their safety while in the past we used to walk to the school." (Fatemeh, IR, ID 40)

Finally, the majority of parents in both countries believe that supporting FMS and sport skills development is mainly the responsibility of schools, as parents do not have the knowledge and time to work on children's skills. They suggested schools should identify children with poorly developed skills and help them be more active and improve their skills.

"I think a lot of this things needs to be driven out by schools where they can adequately and easily assess the child's ability and their progress and it can be charted or could be recorded and it can be documented and then if a child isn't reaching a particular level of activity if it's jumping or running then there should be a red flag associated with that child .....So I think school are better to improve the skills and inform parents." (Oliver, UK, ID18)

As the quote above suggests, parents also feel that schools should keep them informed and raise awareness regarding their children's FMS and have more interaction with them, as they would regarding academic skills such as literacy.

"In school they always have meeting with parents regarding children academic achievement while I think there should be such meeting regarding PA and FMS of children and should inform parents on how their children do in sport." (Ziba, IR , ID30)

In summary, the role of the school was considered differently in each country; while British parents showed satisfaction with school policies and practices and considered school as a positive environment for preventing CO, Iranian parents consider school as an important contributor to CO and especially to inactivity. However, parents in both countries would like schools to have more interaction with them regarding informing them of their children's FMS.

6.8.2.3 Sub-theme 3: Government role

Data also revealed that, although in both countries the government role is considered critical for preventing and treating CO, similar to the school, Iranian parents believe that the government is a significant contributor to obesity in children. Thus, they believe the government needs to take steps to mitigate obesity in children. This is while there was more satisfaction with the British government regarding obesity management and thus a greater belief that parents are mainly responsible for CO. One British mother stated:

"I personally think parents [are responsible for CO], because the knowledge is out there enough, it is on the TV enough ,on the news, it is something that is talked about quite a lot now, I think they[government] are obviously trying raise awareness." (Anna, UK, ID4)

However, some British parents also recommended the government should extend their policies. As an example, Jennifer noted: *"The government, they should encourage shops and companies to cut down on fast foods. (Jennifer, UK, ID8).* In contrast Iranian parents criticized the government for not establishing policies in this regard. For instance, concerning nutrition, Iranian parents wanted the government to establish policies on fast food and sweet drinks, consider tax on sweet beverages, and have more control over food industries and media advertisements and marketing.

"*I think both parents and government are mainly responsible [for CO]. With government for example, government allows fast food to be advertised on TV, always harmful things are advertised on TV, have you* *ever seen TV advertising dates? but crisps, chocolate are things that are advertised a lot." (Rahil, IR, ID 35)*

In addition to criticizing the government for lack of policies on nutrition, most Iranian parents believe that the government pays little attention to sport, such that sport and PA is less valued in society (this was not expressed by British parents). It was considered by some Iranian parents to be a cultural related attitude that needs a government effort to make it a culturally valuable factor.

"In our society I think PA is not considered important enough. Most of the people don't care about PA and I think it originates from our culture which don't value physical activity in life. It is the government's duty to increase people awareness towards the benefits of PA and make education systems to prioritise PA in schools." (Hamid, IR, ID39)

Thus, some Iranian participants suggested that the government needs to encourage people to be more physically active through media or campaigns and to inform them of the importance of PA. Many Iranian parents believed that as the summer holiday is long (three months), the government should allocate free classes for children during this time to help them get enough activity.

"I think the government should encourage people to be more active through media, press, campaigns or even by allocating free PA classes for people and children and considering some sort of incentives for active families specially during summer times, for example schools can be used during summer time for free sport classes, it is really good for children as

they have long summer and can be active during their holiday." (Sahel, IR, ID28).

It was also suggested Iran's government should allocate more funds to schools in order to support renting PE facilities and hiring PE teachers to help make increasing children's activity levels and sport skills more of a priority.

"in order to increase activity level of children and also improving their skills government should support schools financially to help them overcome financial problems for the out of school sport halls cost including rent and transport as well as for hiring PE teacher." (Fariba, IR, ID36)

In summary, the government role was perceived differently in each country. Iranian parents put some degree of blame on the government for CO. They criticized the government for lack of policies regarding food as well as paying less attention to PA in society. Thus, Iranian parents wanted the government to take action to overcome CO by establishing policies regarding food and prioritising increasing PA of children. On the other hand, most British parents were satisfied with government's strategies regarding CO while some suggested the government could take further actions and extend their CO policies.

6.8.3 Theme 2: Reactions to CO and in/activity and FMS levels that undermine change

This theme includes two subthemes: "parental denial" and "Nonchalant attitudes towards CO". These sub-themes highlight ways that participants believe parents may react to their child's weight problem and inactivity that may undermine change. Potential reasons for parents' denial of obesity and inactivity of their children as well as their tendency to overestimate PA and sport skills of children are discussed in this section. Most parents spoke of their views of other parents rather than talking of their attitudes or suggesting they were in denial (although they may not be aware of or willing to admit their own denial).

6.8.3.1 Sub-theme 1: Parental Denial

Denial was viewed as a potential reaction regarding obesity in children that may lead to not accepting or underestimating the problem. Lena Said: *"In my opinion I think it is denial or they just won't accept the fact that their kid is overweight."* *(Lena, UK, ID15).*

It was described that obesity is seen as negative and unhealthy, which may lead to parents not admitting the weight problems of their children for various reasons. Parents' tendency to want to be positive about their children and 'love blindness' was suggested as potentially causing parents to deny obesity in children. The quotes below are from mothers who feel their children are overweight:

"You know parents love their children, no one wants to be negative about their child and obese sounds negative, it is a negative word as it is unhealthy fat you know it's just another word for fat isn't it? It is a horrible word for child." (Amanda,UK , ID11)

"Usually as parents love their children very much, they think their children are better than other children and do not want to accept the truth." (Parvin, IR , ID34).

It was also suggested that parents of overweight or obese children may deny the existence of the problem because they do not want to accept responsibility for it or be blamed for it. They may feel ashamed or guilty or fear being judged for their parenting style or their inadequate knowledge on obesity. This may be particularly acute for parents who themselves are overweight.

"They don't want to be blamed, it makes them feel ashamed or even guilty for not doing well as parents." (Maliheh, IR, ID26).

"They want to deflect responsibility from themselves and don't want to take responsibility, oftentimes parents are overweight too so they feel like that it's attacking them if questions about their child they tend to feel like it's a question on their parenting." (Jessica, UK, ID7)

Not wanting to be blamed was also mentioned to be the reason that parents would find it offensive to be told that their child is obese. Almost all parents suggested that it is better that professionals (either in schools or health centres) inform parents of their child's weight problem, not family members.

"I am sure the professionals would tell them trying to tell them as nicely as possible, just with the more matter of fact way, laying no blame to the parents with suggestions of how to move forward, and make suggestions of what would be normal child eating patterns, to see what changes could be made, and highlighting any health issues as there are uneducated parents out there that wouldn't understand about the health aspects of their child being overweight. I think any way they would get upset

immediately when they face they are responsible or think they have something wrong." (Anna, UK, ID4).

Another issue that may lead to denial is the social stigma attached to the word "obese". In particular, Iranian parents spoke about obesity being traditionally derogated in the Iranian culture, so people may try to deny it to avoid social stigma even though obesity rates are increasing.

"It is because obesity is not accepted in our culture, it is considered negative for many years although it is increasing among children still is not accepted in society. When it is said someone is obese automatically people think they are lazy, not quick and are overeaters" (Hamid, IR , ID39)

Perhaps in contrast to the problem of social stigma, parents' denial of CO may also be a result of obesity becoming more normalised in society. In both countries, parents believe obesity has increased compared to the past, however it was mainly British parents who said they felt that obesity is more accepted these days. Some parents suggested that increased exposure to obesity, through overweight children in school and society, as well as the availability of larger clothing, can result in increasing the acceptance of overweight as a norm and hence lead to denial. This may prevent parents of overweight children from realizing their child's weight is an issue. The quote below is from Emma who believes her son is overweight.

"kids in this country look at each other and accept the way everyone is , when you go shopping you see clothes such as like 10 to 12 sizes and it's

became normal. Also at school is taught it is right to be like this and it seems it is considered normal and is not a problem" (Emma, UK , ID19).

Denial may not only be an issue in relation to realising CO but it may also be involved in parents overestimating their child's PA and FMS. As with denial of obesity, parental 'love blindness' and tendency to be positive about their children were named as reasons for parents overestimating their child's PA and FMS. One British Mother stated:

"Culturally some people like to exaggerate about their children. They don't want children to be loser compared to other children thus exaggerate their PA and skills ability" *(Kate, UK, ID6).*

Parents are aware PA is healthy, so it was suggested that parents may not want to accept responsibility or to be blamed for their children not being sufficiently active, or to be judged on their parenting style. This may lead to parents overestimating their child's PA (as highlighted by Farideh) and FMS (as highlighted by Lena).

"*Parents like to overestimate PA of children because they know their child is not active enough and it is their responsibility to make them more active, so to deflect their responsibility they exaggerate about it" (Farideh, IR, ID30)*

"*This could go back to that maybe they don't want to put their child down because they think that if their skills isn't really good means I haven't practice with my child." (Lena, UK, ID15).*

Similarly, parents are aware of the health risks of SB, especially its impact on weight, so it was also suggested that not wanting to be blamed or judged on their parenting style and/or feeling guilty or ashamed about their child being sedentary for long periods of time may be an explanation for underestimating their child's SB *"of course you don't want to say your child is sitting like for 6 hours it make you feel bad and guilty" (Emma, UK, ID19)*

Although parental denial and underestimation was suggested to be a reaction to SB in both countries, another trend among Iranian parents was the possibility of overestimation of inactivity of children. While parents in both countries expressed their concern regarding high SB of children, Iranian parents seemed to be more concerned than British parents. As parents are concerned about the levels of inactivity both in school and at home in the modern world, along with the detrimental consequences of inactivity, Iranian parents felt it was possible that this may lead to exaggerating the scale of problem, which could lead to overestimating SB.

"You know the new generation are very inactive these days at home and even in the school which is dangerous when I see my children are inactive for long time it is annoying me so maybe that is why some parents overstate it as it gets bold in their mind" (Neda, IR , ID23)

Farideh also noted that overstating the problem is a deliberate strategy she uses to encourage her child to be more active.

“ *I always overstate my child’s inactivity to encourage him to be more active, you know I really suffer when I see he is inactive for long time so I try to make him active by nagging to him” (Farideh, IR, ID 21).*

In addition, social stigma attached to active children such as hyperactivity and not being polite was proposed by some Iranian parents as a reason that some parents may overestimate inactivity of their children in order to avoid such labelling for their children.

“Sometimes parents’ overestimate their children’s inactivity as they don’t want their children to be labelled as hyperactive” (Sanaz, IR , ID29)

Overall, in both countries denial was shown to be a possible parental reaction leading to underestimation of obesity and SB and overestimation of PA and FMS of children due to parents deflecting responsibility, ‘love blindness’, and not wanting to be blamed or judged by others. In addition, social stigma attached to obesity was a possible reason for denial reported mainly among Iranian parents. In the UK it was believed that obesity is somewhat normalised and thus denial due to normalisation of obesity was mainly cited as a possibility by British parents. It also emerged that Iranian parents’ concerns regarding SB of children both at home and school can also result in overestimation of the problem.

6.8.3.2 Sub-Theme 2: Nonchalant and positive attitudes towards CO

It was reported in both countries that for some parents a chubby child is a sign of being healthy and strong. For instance, this is illustrated from Jullia’s quote about her daughter:

"As I said my daughter's I mean she looks healthy and strong she never really looked overweight, at one stage she looks slightly kind of stronger rather than meatier but when we put her weight and her height into this app it told us she was obese and it was up you know so I don't think she is obese." (Jullia, UK, ID10).

In addition, some Iranian parents suggested that a chubby child could be considered cute by some people (this was not cited by British parents). For example, Rahil said: *"many people like chubby children, it is considered cute and sweet, so that's why some families don't care about overweight of their children" (Rahil, IR, ID 35).* Children being chubby was considered to be accepted for young children but it gets problematic for older children (school aged children). Two Iranian mothers acknowledged they used to overfeed their children in early ages as they liked a chubby child. They mention the turning point for realising their child's weight problem was the health conditions of their children as they aged.

"I love chubby kids, with my two children I tried to overfeed them deliberately because I wanted them to be chubby, it is cute for kids to have fat in their body and I believe it is not a problem before they get to school.....now that they are older they have problems with their weight specially my son, he has some health issues which is why I realised he is overweight" (Parvin, IR, ID34).

The impact of different cultures within countries was also discussed. This was mainly in the UK sample which was more multi-cultural than the Iranian sample. For example, being thin or slim in some cultures is said to be a taboo, for example Rayan talked about his culture: " *because even in* *my culture {African} it could be a taboo if a child is really thin, they could tell you that you don't give your child anything to eat" (Rayan, UK, ID9).* Furthermore, it was also mentioned that in some cultures being overweight means you are not poor and is a sign of being able to afford food.

"Maybe it's just lack of awareness maybe they just seeing being a bit meaty is acceptable in some cultures for example in some countries having a bit of meat on you means that you're not poor and you can afford food I work in HIV for different cultures to them overweight is displaying that they are not poor so you've been a bit overweight is seen as healthy in some cultures." (Neli, UK, ID17).

Another trend that was reported in both countries was the belief that some parents are not very concerned about obesity in children because they believe their child will outgrow it over time. For example, Fatemeh said: "*Sometimes parents don't care if their child is overweight or obese as they believe they outgrow it" (Fatemeh, IR, ID40).*

In summary, some attitudes to CO that may undermine change were reported. It was revealed that in some cultures an overweight or obese child is an indication of being healthy and strong or may be considered cute, while being thin /slim is a taboo or sign of being poor or not healthy. In addition, the notion that children grow out of obesity overtime was mentioned in both countries, and this may be another attitude that may undermine realising obesity.

6.8.4 Theme 3: Barriers to preventing CO and promoting healthy behaviours, PA and FMS

This theme includes four sub-themes: “Time, cost and convenience”, “Parents’ knowledge and education on obesity and healthy behaviours”, “ Parents’ ability to identify overweight and assess SB, PA and FMS” and “Child related barriers”. Various perceived barriers to preventing CO and improving children’s healthy eating, PA and FMS in both countries are highlighted in this section.

6.8.4.1 Sub-theme 1: Time, cost and convenience

Time and cost were the two primary barriers cited in both countries regarding eating healthily. However, some participants believe time and cost are the kind of barriers that can be manageable. For instance, some parents indicated that although expensive food is a barrier to healthy eating, there are alternative, cheaper options available for eating healthily, so time is a bigger barrier.

“For cooking healthy food at home it's not about the cost it is about the time you really can go to the supermarket like Aldi's and stuff gets things for cheap but it's just the time that's the problem that most parents are working all the time then get the time to cook so at home I think is mainly about the time not the cost.” (William, UK, ID5)

Regarding time, some working mothers believe it depends on the parents’ knowledge and the importance of eating healthily, so if it is a priority, it can be manageable.

"Although I am working full time and time is a barrier for me but I provide my family food in advance as I really care about eating healthy food." (Bahar, IR, ID25)

Time and cost were also mentioned to be the main barriers for parents to increase PA of their children. Having other children to look after, life demands and employment were all mentioned to prevent parents spending time doing PA with their children, taking them to organized activities or observing their PA and FMS. Some parents also commented that transportation to organized activity classes is another barrier for them.

"Children have plenty of time after school at home so they can attend organized PA classes but you know it is difficult sometimes as it demands time and sometimes cost too much. In addition, transportation is a problem sometimes you have to take them to the place then pick them up which is again time consuming and need transportation arrangements." (Soheyla, IR, ID31).

However similar to eating healthily, some believe that time and cost are the kind of barriers that can be manageable and parents can overcome these issues, such as by doing unstructured free activities on weekends.

" Although time and cost are limitations but there are many activities you can do for free on weekend, I think everyone can find some time on weekend to spend with children, there are lots of parks you can walk there, don't be lazy do cycling or take a ball go there and play with children." (Sahar, IR , ID28)

Parents' preference for convenience regarding children's diet and activity were mentioned by some parents in both countries to be a barrier to improving these behaviours in children. The first quote below highlights the issue of convenience food, and the second quote highlights the convenience of keeping children occupied, but inactive, using technology.

"*it's just an easy process of giving them (children) a chocolate bar, a pack of crisps or processed pizza or a curry or a takeaway, it's too easy to get yourself trapped in that process." (Oliver, UK, ID18).*

"Even parents themselves are very inactive these days due to excessive use of mobile phones ..., so instead of taking children out and doing activity with them they prefer to keep children busy with x-box or a tablet and they themselves get busy with their phones or do their own things." (Nazanin, IR, ID37).

Some parents believe time and cost are simply used as excuses and it is just a matter of laziness and preference for convenience in relation to healthy eating (highlighted in the first quote below) and PA (highlighted in the second quote).

You know I think people are becoming lazy these days, they prefer convenience I know many women that are not working and have enough time at home but they are lazy and don't bother to cook they buy some fast food or ready food from restaurant, You know I think they don't really care about their children diet and food (Farideh, IR, ID21).

"I think cost and time are excuses, some parents just want the convenient, they want to sit at home, it is difficult for them to take children out and play with them." (Fariba, IR , ID36)

In summary, in both countries time, cost and parents' preference for convenience were highlighted as barriers for improving obesity-related behaviours of children. However, some parents believe these barriers can be manageable and are just excuses.

6.8.4.2 Sub-theme 2: Parents' education and knowledge on obesity and healthy behaviours

Data revealed almost all parents in both countries were reportedly aware of the detrimental impact of obesity and inactivity on the physical and psychological health of children (e.g. heart problems, diabetes, cancer, depression and low self-esteem).

" If obesity is started at a very young age it could bring on a lot of health complications like there's increase rate of cancer heart disease diabetes as for any other factors, you'll also hear about so many youngsters with type 2 diabetes." (Amanda, *UK, ID17)*

Although various factors such as diet, activity level, genetic and psychological factors were highlighted by parents as contributors to childhood obesity, participants felt that parents of overweight children don't have enough in-depth knowledge on CO, contributors and related factors, and education is needed.

"I think it is due to lack of knowledge, the family should be educated first, the parents should be educated about the healthy eating, the way the body uses the food, and also other issues should be taught like what are the

causes of obesity, what are the diseases related to obesity." (Soheyla, IR, ID31)

Parents' lack of knowledge on the definition and contributors to CO was an issue that was highlighted by some participants. For instance, Jullia who recently had been informed that her daughter was categorised as obese stated:

"We don't really know the facts I didn't believe that she was obese ever so maybe that's why, we don't really know the actual facts of obesity and on obesity causes I would never have had her down as obese it shocked me when I saw that, it was really horrible to say she is obese. I think just because it's a medical term (obesity) really and we don't really know what the meaning of it." (Jullia, UK, ID10)

In general parents' lack of nutritional knowledge was highlighted as the most significant barrier for preventing CO. This includes knowledge on; how unhealthy foods contribute to obesity; what are healthy or unhealthy foods; the amount and frequency of the food children need to have. Here is a quote from Rayan, a father who feels his child is overweight.

"Food, food is a big problem even some of the parents including us need educating on what is healthy and not, I think education is important because some people don't even know what they are eating they just cook traditional food and give it to their children. Some children go to the kitchen and get what they want without parent's supervision. I think parents' education is important you know three times meal is not really necessary you should eat when you need maybe have one main family meal and not heavy stuff, telling them not to eat after certain times after 5

or 6 and I think that comes back to parents' education even for portion sizes also parents need to know don't overfeed their children." (Rayan, UK, ID9)

In addition, two parents also highlighted that even where parents have some knowledge, they may need support to help them apply the knowledge or a trigger to put their knowledge into action. Parvin who says she has two overweight children noted:

"[To prevent CO] parents need to listen to nutritionist and follow their advices, even themselves can find information through internet however the reality is that we are used to have someone to tell us what to do, we know many things but we don't apply them unless someone accompany us, most of us are like this, we don't act or accept something unless there is a pressure to do so or if we feel a danger." (Parvin, IR, ID34)

Parents suggested that schools may be one such source of support. They could use their position as an influential environment to help educate parents and increase their knowledge of healthy eating and obesity.

" *I think the parents are uneducated and on the way they don't actually know how to do it and it's a vicious circle, I think there should be more of interaction between parents and schools, more workshops for parents to give them information, given them talk or cooking classes cos sometimes they don't know what food to buy so they end up buying just process food where as it is actually cheaper to buy healthy food but if they were given a platform when they could be taught all the skills especially for young mothers and even working mothers". (Jessica, UK, ID7)*

Parents' knowledge on the description, guidelines and recommendations for SB, PA and FMS were also mentioned by few parents in the two countries as a barrier to assessing and improving these behaviours in children. Being unable to differentiate between activity and inactivity was mentioned by an Iranian mother who believes some parents think any small movements are activity.

"Sometimes parents are mistaken, they can't differentiate between activity and inactivity, and for example whatever movement their children have they consider it as PA because they don't have enough information." (Neda, IR, ID23)

Being unaware of guidelines for PA was mentioned by some participants, who stated that when parents are unaware of guidelines and requirements for PA, they cannot accurately perceive their child's PA.

"I think it is because parents are generally uneducated regarding the acceptable levels of their children's requirements for physical activity and guidelines. .... if parents are asked to fill in a questionnaire about a children's physical activities probably 99% of them wouldn't know the truth facts and figures." (Oliver, UK, ID18)

It was shown that overall, most parents are unaware of FMS. The majority believe being unaware of the references and standards, as well as the importance of FMS are the reasons that parents are not able to realise their child's skill level.

"I think because parent do not know about it and they don't have the knowledge. We require a tool to measure everything. To determine if a child is good or not, that is, to compare with the standards and say that this child is above the standard or below the standard. Therefore, when we do not have the criteria for measurement and do not know it, we speak in general terms." (Ali, IR , ID27)

However, some parents do not seem to consider that knowledge and understanding of these skills is important. They believe children do not require any particular skills and just need to get involved with activity.

"I don't think they need any particular skills or anything but they just need a basic thing just running around and some kids really like that but I think anyone could take part in physical activity it's just the facts of knowing the basics." (William, UK, ID5)

Overall, in both countries, participants believed that parents don't have enough in-depth obesity knowledge. Parents' lack of nutritional knowledge was cited as the main barrier for preventing CO, while less attention was paid to activity levels of children. In addition, parents' lack of knowledge on the description, guidelines and recommendations for SB, PA and FMS was mentioned to be a barrier to parents improving their child's activity levels and FMS.

6.8.4.3 Sub-theme 3: Parents' ability to identify overweight, activity levels and FMS

The data revealed that in both countries, one barrier regarding promoting healthy behaviour and preventing/reducing obesity is that parents struggle to properly assess and identify obesity, PA, SB and FMS in children.

Concerning obesity, the most frequently employed means of identifying an overweight child was visually assessing one's appearance. Many parents indicated having extra fat especially around the belly is an indicator of obesity in children.

"*First thing you see is usually the kid's body, usually Kids start developing a big belly or stomach, extra fat around their face or their arms." (Rahil, IR, ID35).*

However, a minority of respondents reported that identifying obesity is not easy, except for in extreme cases. Rayan noted:

"*It's really difficult unless the person is really really big and you can see you know they are different then you will say oh maybe they are overweight or something like that." (Rayan, UK, ID9)*

Visually comparing the child with other children was also a means of identifying overweight in children for some parents in both countries.

"*with my daughter I compare her with her classmates, then I see for instance 15 out of 20 pupils are similar while two are obese so I can realise if my child is ok, for me is by comparing them." (Sahel, IR, ID28)*

However, as previously discussed under the "Parental Denial" subtheme, parents (especially British parents) noted that as obesity has become more normalised among children, it makes it more difficult for parents of overweight children to realise obesity in their children, even when they are comparing them to other children.

“Whenever I collect (son’s name) from school I see more children who obese compared to the past, it is very concerning. I think when more children are obese it becomes normal, so parents look at other children of the same age and they feel their child is similar to them and say yeah my child is normal without realising that in fact those children are overweight or obese” (Ziba, IR, ID30)

Some Iranian parents suggested that besides taking care of some aspects of children’s health (e.g. teeth and eye test), schools need to assess children’s weight status and inform parents of overweight/obese children. *“I think Schools should identify overweight children but unfortunately they don’t. They have a health educator at the elementary schools, but they only care more about children’s teeth or hair’s hygiene, and they do not care at all for obesity and things like that. It would be very useful if schools informed parents that their child has weight issue (Farideh, IR, ID30).*

Behavioural factors such as children eating unhealthy food and snacks as well as overeating were reported to be indicators that make some parents aware of their child’s weight problem. Some parents talked about big portion sizes for children as an indicator for overweight in children.

“My nephew is 8 years old and obese,….when we go out for example McDonald’s he always has adult food, why? You should have small food. Unfortunately, some parents don’t realise these things.” (Liana, UK, ID16).

Other behavioural indicators of obesity included: being lazy, tired, and inactive and struggling with physical activities. Some parents observed that overweight children are less active compared to normal-weight children.

"when a child becomes obese, a series of activities will automatically decrease which is a sign for parents to realise their child is gaining weight. Also they get more lazy and inactive, their activity decreases." (Hamid, IR, ID39)

Parents also spoke of ways of identifying whether or not a child is active, such as their overall appearance being unhealthy.

"*Inactive child is pale and depressed, but if they are active, they are cheerful and thin." (Bahar, IR , ID25).*

In addition, behavioural factors such as sitting too much, excess use of electronic devices including watching TV and talking about electronic games were mentioned as factors in identifying an inactive child. Some also related it to not moving, not being energetic, being lazy and not participating in sport. The opposite signs were cited to be indicators for identifying an active child.

"I think those who sit too much and watch TV (are inactive) while if they are active they run around all the time and you don't see them to sit for long time." (Rahil, IR, ID35)

A few participants talked about the child's ability to concentrate on lessons as a good indicator of an active child:

"Active children are very quick physically and mentally, their concentration on lesson is good (Hamid, IR, ID39)

When it comes to FMS, parents struggle to identify skills because they do not know the benchmarks, so comparing children's abilities with others was considered as a method to assess children's FMS by some parents. This included comparing their child's ability to their own ability when they were a child, or with other children such as their siblings or peers to realise if their child is doing well.

"*Well comparing children with their peer is good for example when they are running compare them to see whether their skills are good or not." (Fatemeh, IR, ID31)*

This comparison, however, was questioned by two parents who believe that it depends on the skill level of the person they compare their child's skill with, and as a result they might either overestimate or underestimate their child's skills.

"Sometimes parents compare children's skills with others which is not correct, every child has different abilities, and one might be good at shooting other one might be good at running, so parents they need to know what the criteria are." (Mahnaz, IR , ID2).

It was also stated that sometimes parents rely on other resources such as children's own reports instead of watching and observing their children's skills. For instance, William said: "*most parents don't see the kids doing these skills, so they just listen to their kids talk about their own abilities." (William, UK, ID5).* While Oliver believes children's own reports might not be accurate as they like to inflate their abilities*: "Probably children also over inflate themselves as well." (Oliver, UK, ID18).*

Data also revealed that not having the opportunity to observe their children's activity and their FMS is a barrier to parents' awareness, leading them to often make assumptions and guess their child's activity levels and abilities.

"*Maybe they (parents) just guessing or something like that because they don't know their children's abilities as they don't observe them." (Lena, UK , ID15)*

The perceived impact of lack of time due to busy lives on PA was discussed under a previous subtheme (time, cost and convenience), and this was considered to reduce the opportunity to observe children's PA and FMS. However, ultimately much of the blame for the lack of observation was placed on parents:

"They don't observe their children while playing they are present at playground but keep chatting with friends so don't see their child's skills. I think it is ignorance." (Emma,UK , ID19)

Additionally, not observing children while they are at school was also mentioned to impact parents' awareness of activity levels of children in both countries. Mostly parents believe their children could be doing less PA than they imagine, and as discussed under a previous subtheme (school role), Iranian parents have specific concerns about the inactivity levels of children in school.

"They're at school and you don't know exactly what they're doing that for, all you know that could be running around but actually it might be like sitting down and playing on a computer during lunch time or break time." (William, UK, ID5).

"Even sometimes due to weather condition children stay in classroom and play brain games this is what I hear from my daughter a lot while school do not inform us." (Neda, IR, ID23)

Some parents in both countries also mentioned that not observing children is problematic especially for assessing activity levels of overweight children. They suggested that overweight children may sit and watch other children instead of playing or they may get tired earlier, while parents think they are active. However, some parents who perceived their children to be overweight believe the opposite might happen, that is, parents might assume they are less active, when they are not. Parvin stated:

"Sometimes we misjudge overweight children because of their weight, for example with my son he is overweight and is not really sporty but sometimes he tells me that he is been playing some sport which surprises me." (Parvin, IR, ID34)

In summary, it emerged that to identify overweight and in/active children parents rely on behavioural, physical and psychological factors, not all of which (e.g. making comparisons to other children) are reliable. In addition, parents in both countries appeared not to be able to identify FMS. Not observing children both at home and school was revealed to be another reason that impacts parents' ability to identify their child's activity levels and FMS.

6.8.4.4 Sub-theme 4: Child related barriers

Peer pressure was considered by some parents in both countries to be a barrier to eating healthily and PA of children, which was also mentioned to undermine parents' efforts to encourage their children to be active and eat healthy food. For example, one mother noted:

"Sometimes I don't know what my child is eating in school, I provide healthy sandwiches and snacks for her but she tells me she wants chocolates or sweets or cakes as her friends have them always and share it with her. I tell her this is not good for your health, but she says why do my friends have it, you know peer pressure is powerful" (Neda, IR, ID23)

Children's preference for unhealthy food was mentioned as a challenge to healthy eating.

"I am lucky that I cook but I have a child who is a fussy eater and he doesn't like this or that, there are few foods that he likes but really all are very bad for him like a pizza, a hamburger or sausages. One thing for parents is to at least go for healthier options if child likes McDonald's, then go but only once a week or instead of chips get fruit or vegetables." (Liana, UK, ID16)

Children's preference for being inactive and not participating in PA and sports was also cited in both countries as a barrier.

"I think that you can't push someone do something that they don't like,some children just don't like or enjoy sports in general." (Rahil, IR, ID35).

Children's weight was cited as a barrier to PA both physically, by making it more difficult for children to participate (e.g. due to not being able to move so quickly), as well as psychologically, by influencing children's self-esteem as they don't want to be mocked by other children during sports at school. Liana who believes her son is overweight noted:

"you know my son I put him in tennis club football club swimming club kickboxing club ... he wasn't good in any of them because he was so overweight couldn't do any of them ....also my son did not do activity in school cause he had excuse he said I have asthma but it was because he was overweight and didn't want other children to laugh at him." (Liana, *UK, ID16)*

Some parents in both countries also talked about the possibility of PE teachers paying more attention to normal weight children and not trying to involve overweight children in various sports, which may undermine activity levels and development of FMS and sport skills in this key group. This was however mainly reported by Iranian parents. A mother said:

"You know I have seen some teachers put normal weight children in sports that require more agility and speed like football, basketball while they offer overweight children sports like badminton or table tennis as they think their weight is a barrier for them, also I think they don't what to bother themselves." (Sanaz, IR, ID29)

A minority in both countries highlighted children's lack of FMS to be a barrier for children's participation in PA.

"I think children need basic and fundamental skills to be able to participate in PA, unless they want to do a specific sport that requires advanced skills." (Hamid, IR, ID39).

However, most parents believe that as long as the child is fit and healthy, they do not require skills, and rather should get more involved with PA regardless.

"Some children might not be able to do it for the disability or something. So as long as child is healthy and fit they should be able to do most things shouldn't they?" (Marry, UK, ID14)

Overall, in both countries, peer pressure to engage in unhealthy behaviours, children's preference for unhealthy food and prioritising computer/electronic games over PA, child's weight and lack of FMS were all mentioned as barriers to preventing or reducing obesity and improving healthy behaviours of children.

6.9 Discussion

The current study intended to examine and compare the British and Iranian parents' attitudes and perceptions towards CO, SB, PA and FMS of children. In particular, investigating underlying factors which affect parents' in/accurate perception/awareness of their child's weight status, PA, SB and FMS was the aim of this study. Based on the interviews with the parents and comparisons examined within the analysis employed, the findings of this study offer unique and rich insights within the field of CO research, across an Asian and a Western country. The findings of this study support existing data in the literature regarding the parents' critical role in the development of healthy/unhealthy behaviours of children

(Golan & Crow, 2004; Kluck, 2010; Lundahl et al., 2014; Sallis, Prochaska, & Taylor, 2000; Taylor et al., 1994). This adds to the depth of current knowledge on how family and social environments in two different countries can influence children's weight and related behaviours. Furthermore, the findings from this study also provide valuable insight into factors underlying parents' in/accurate perception/awareness of their child's weight, PA, SB and FMS.

6.9.1 Overview of findings

Overall, it was found that while British parents place the responsibility for obesity and inactivity of children mostly on the shoulders of parents, Iranian parents believe schools and the government also play a very significant role as external contributors. Parents' denial as a reaction to CO, inactivity and poor FMS of children was suggested by participants as an underlying factor for parents' inaccurate perception of their child's weight, SB, PA as well as FMS level. Reasons for parents' denial were suggested as love blindness and tendency to be positive about their children, as well as deflecting their responsibility, avoiding social stigma, or alternatively, normalisation of obesity. Although found in both countries, some reasons appeared more often in one group then the other. For example, British parents talked more of denial of CO in relation to deflecting their responsibility. Avoiding social stigma attached to CO was mainly discussed by Iranian parents, whereas normalisation of CO was mostly raised by UK parents, probably due to higher rates of CO in the UK. Similarly, denial was a common reaction to high levels of SB suggested by British parents, but Iranian parents also talked of the opposite; overestimating SB of children. This was a strategy to encourage children to be more active, or to receive support from schools or the government to reduce SB of children. Moreover, in both countries nonchalant and positive attitudes towards CO (e.g. CO being a sign of health or children growing out of it) were suggested to be another reaction that led parents to misperceive CO. Various barriers to promote healthy behaviours of children were identified (e.g. time, cost, convenience, child preference and peer pressure). Some barriers such as parents' lack of knowledge on CO and related-behaviours such as nutrition, PA, SB and FMS (including identifying CO and inactivity), as well as not observing children's SB, PA and FMS were suggested that impact parents' in/accurate perception of the aforementioned factors in both countries.

6.9.2 Responsibility for CO and health behaviours of children

Responsibility for CO was a main theme highlighting the participants' perspective on the role of parents, school and government. Differences were found between the two countries in parents' perceptions of the attribution of responsibility.

6.9.2.1 Parents role

The parental role was a sub-theme that emerged describing perceived contributors to CO as well as various mechanisms through which parents may contribute to CO and SB. It is well documented that PA, SB and nutrition are important contributors to CO and parents play an important role in the development and improvement of these behaviours of children (Braley, 2016; Corder et al., 2010; Davison & Birch, 2001; Golan & Crow, 2004; Lundahl et al., 2014; Taylor et al., 1994). A lifestyle with poor diet, low levels of PA, and high levels of SB is highly prone to obesity (Braley, 2016; Golan & Crow, 2004; Maximova et al, 2008; West et al., 2008).

Most parents across both countries held similar attitudes about the major contributors to CO (i.e. diet, low PA, SB and technology) and believed that the role of parents and parental lifestyle (are two of the) predominant factors and influences on a child's weight, behaviours, attitudes and health. These influences were proposed to be through: parents' eating and activity role modelling and reinforcement, their attitudes, the food and opportunity for PA they provide, their encouragement to eat healthily and be active, as well as the control they exert over food choices and activity levels. This acknowledges that parenting styles and parents' unhealthy practices may reinforce obesity if they allow children to engage in unhealthy eating, more screen time and skipping physical activities (De Brun, McCarthy, McKenzie & McGloin, 2013; Wolfson et al., 2015).

Concerning inactivity of children, existing research shows that children in general are becoming more inactive and are following a more sedentary lifestyle (Di Cesare et al., 2019; Robinson, 2011). This current study found that parents in both countries held perceptions to support this claim, discussing how children are not only becoming more sedentary, but that technology (i.e. TV and electronic devices) is the number one contributor to inactivity and obesity in children. Consistence with other studies, parents restricting screen time of children was considered an important responsibility of parents to reduce SB and adverse consequences of inactivity including CO (Grewal, 2013; Hesketh et al., 2005; Pearson, 2011). Likewise, parents' feeding practices and their control over children's food (e.g. restricting children's access to unhealthy food, limiting their sugar consumption) are proposed as another critical responsibility of parents in order to prevent CO (Etelson et al. 2003; Lydecker & Grilo, 2016; Sherry et al, 2004). However, in line with other studies, various perceived barriers such as time constraints, lack of knowledge, parents' denial, and peer influence and child preference were proposed to hinder parents enforcing restrictions on their children's unhealthy behaviours (Gillespie et al., 2015; Hesketh et al., 2017; Knowles et al., 2015). Although encouraging parents to apply appropriate strategies and practices, as well as restricting unhealthy behaviours of children, is critical for intervention programs, there is also a need to support parents in overcoming and managing the barriers (Hart et al., 2003; Hesketh et al., 2012; 2017; Slater et al., 2010). For instance, Hart et al. (2003) propose that instead of using a “what to do” approach a “how to do” approach should be considered with weight management programs aiming at improving diet and healthy behaviours of families and children. The perceived barriers by parents in this study will be discussed later in more detail.

Regarding healthy behaviours of children there were differences in parents’ views and attitudes in the two countries. In this regard Iranian parents reported focusing upon educational success at the expense of participation in PA which was suggested to result in increased SB of children. The importance of educational achievement and its priority over PA has previously been reported among Middle Eastern communities (Dwyer et al., 2008; Mohammadpour-Ahranjani et al., 2014; Rothe et al., 2010; Trigwell et al., 2015). However, it is shown that besides the impact on the health and mental wellbeing of children, regular PA can improve academic performance of children (Sullivan, Kuzel, Vaandering, & Chen, 2017). The increase in cognitive functioning is associated with improvements of attention, memory and Intelligence Quotient (Bryant et al., 2014; Howie & Pates, 2012). Thus, intervention programs in Iran need to encourage parents to prioritise regular PA of children as this can increase their academic attainments.

A further cultural difference was regarding parents’ perception of external contributors to their child’s healthy behaviours, particularly PA of children. For instance, although both groups believe that parents' strategies regarding electronic devices are a key influence on inactivity of children, Iranian parents attributed excessive use of electronic devices and SB to living in apartments as an external uncontrollable contributor. In fact, the sense of having less control over a problem reduces the responsibility of individuals (Wolfson et al., 2015). Thus, as a result, Iranian parents may feel less responsible. Other external contributors considered to be problematic by Iranian parents were the school and government. While all the participants strongly believe that parents bear primary responsibility for their children's weight status and activity level, Iranian parents felt they shared the responsibility with the school and government policies. This is while most research has found that attribution of responsibility for CO to school/government is much less than attributions to parents (Braley, 2016; De Brun et al., 2013; Hesketh et al., 2005; Wolfson, et al., 2015). These studies were conducted in western countries which reinforces the need to investigate other countries and consider similarities and differences.

6.9.2.2 School role

Iranian parents believe schools encourage children's inactivity and unhealthy eating, and that schools do not focus enough on physical education during school hours. In contrast, parents from the UK were more satisfied with (the level of involvement from) schools. In Iran, children finish school before lunch, though the source of daytime food in school is from the canteen which sells snacks. Parents in this study perceived school canteen as one of the main barriers to healthy eating of children which sabotages parents' efforts to promote healthy eating. Parents expressed desire for more control over these canteens. In order to improve children's eating behaviours and help them to maintain a healthy weight, schools in Iran are urged to provide healthy snacks and food for children and limit their access to unhealthy food in school (Amini et al., 2014; Taghizadeh et al., 2021). In contrast, most parents from the UK believe schools take care of the quality of healthy food available in schools for lunch. However, the availability of unhealthy food such as chips or burgers even once a week was concerning for some British parents. Also, some parents believed that deserts need to be removed from school meals and replaced with fresh fruit and vegetables. In fact, in England since 2014, schools are required to comply with the national school food standards which came into force in January 2015 (Department for education, 2019). Schools are urged to provide nutritious, high quality, tasty food and drinks to pupils (Department for Education, 2019). However, as meeting these food standards are not mandatory for all academies, there is a need for a universal food standard to provide healthy food for all children in the UK (BDA, 2018). In addition, it is reported that the Department of Education does not monitor whether or not schools meet these food standards requirements (NAO, 2020).

In summary, the findings suggest a need for schools in Iran to provide healthy food for children in the canteen. In addition, there is some room for nutrition improvement in British school lunches.

Concerning activity levels, the Iranian children's routine in schools is focused on academic activity which keeps them sitting in their classrooms for long periods of time. Children having few opportunities for PA participation in school in Iran is reported to be a reason for their low levels of PA (Amini et al., 2014; Kelishadi et. al., 2007; 2010; Mohammadpour-Ahranjani et al., 2014; Mozaffari & Nabaei, 2007; Taghizadeh et al., 2021).Various reasons are reported for the low levels of PA in school for Iranian children: lack of open spaces, limited playgrounds attached to schools, an emphasis by school authorities on children's education which results in academic subjects having priority over PE. Limited PE time, not considering PE seriously, poor delivery of this subject, and not assigning PE teachers in some primary schools are also issues. All these reasons ,along with school staff being concerned about the health and safety of children while in school yard, to the extent that they curtail children's activity during break time, were mentioned by Iranian parents in this study. Not taking PE seriously was also proposed to result in not developing the FMS of Iranian children.

In line with findings of other studies, lack of time and pressure to meet academic targets was also a reason for less focus on PA in Iranian schools (Amini et al., 2014; Gupta et. al., 2007; Kelishadi et al., 2010; Mohammadpour-Ahranjani et al., 2014; Mozaffari & Nabaei, 2007). Providing more opportunity for PA participation of children and good quality PE was desired by all Iranian parents. Due to high levels of SB and low PA of Iranian children, increasing activity levels of children is a priority that needs to be considered by intervention programs (Kelishadi et al., 2016). Increasing PA, as stated earlier, can optimise children's academic performance (Howie & Pate 2012; Sullivan et al., 2017) which might reduce the pressure on both parents and school in this regard.

In the UK, as part of the government plan to control and address CO, the PA of children in school is paid particular attention and there are various programs (e.g. "Daily Mile") for increasing activity levels of children (DHSC, 2018; PHE, 2020; RSPH, 2015). In general parents were satisfied with the PA of children in school and providing a variety of sports in school was considered important by British parents. Nonetheless, an issue that was raised only by one British mother is a lack of specialised PE teachers in primary schools in the UK (Lynch, & Soukup, 2017; Blair &

Capel, 2013). In the UK, it is reported that many schools (both primary and secondary schools) employ sport coaches with no teaching qualification and there is a need for specialist qualified teachers to run the PE subject (Griggs, 2012; Lynch, & Soukup, 2017). The delivery of PE in British primary schools is reported not to be efficient. Not assigning PE teachers was considered a big problem by Iranian parents as the majority reported that classroom teachers run the PE subject. The reason only Iranian parents raised the issue of the need for a trained PE teacher, might be result of PE being less prioritized in Iran which has affected the amount and quality of PA of Iranian children in school. Considering that most primary schools around the world don't assign specialized PE teachers to run the subject, and PE is receiving less attention compared to secondary school (Lynch & Soukup, 2017), it is therefore important for school-based intervention programs to consider specialist teachers if they are to improve both FMS and PA, in order to encourage children to maintain a healthy weight.

Another finding from this study showed that Iranian parents felt that there was a link between low activity levels of children and the way children travelled to school. Being driven to school by car (private cars or a school bus), due to poor public transport systems, as well as parents' concern regarding road safety, has become a trend among Iranian children (Amini et al 2014; Mohammadpour-Ahranjani et al., 2014; Dehghan et. al., 2005). In the UK, although the number of children being driven to school seems high, it was not raised by parents as a problem contributing to inactivity. There are no reported statistics available in Iran on this issue, while in the UK, according to a national travel survey in 2017, nearly 51% of primary school children (aged 5-10 years) in the UK are driven to school (Department of Transport, 2017). Salway et al. (2019) found that 67% of children walk to school, which is higher than the statistics from the national travel survey (Salway et al., 2019), so this may not be such an issue for British parents in the present study.

It is important that schools create a healthy environment for children and equip them with adequate health knowledge in order to encourage them to foster a healthy lifestyle (Department of Health and Social Care, 2018). Schools serve as an important potential target for interventions to be utilized in preventing CO (Hesketh et al., 2005) and this seems especially important in Iran. In both countries, parents felt, that children should be educated from an early age on healthy behaviours, CO and associated consequences. This would pre-empt problems in the teenage years where higher levels of obesity were shown (in previous research) among secondary school children compared to primary school children in both countries (Department of Health and Social Care, 2018; Khashayar et al., 2018). Childhood is reported to be a good period of time for applying multifaceted lifestyle interventions to both prevent and treat obesity (De Giuseppe, Napoli, Porri, & Cena, 2019; Pandita, et al., 2016). However, in order to be preventative rather than reactive, intervention programs should consider educating primary school children on healthy behaviours and CO.

Some Iranian parents also expressed their desire for schools to have weight management programs that involve parents. Although schools in Iran take care of some aspects of children's health, they do not seem to consider obesity (Taghizadeh et al., 2021). The reason might be that it is not easy for schools to prioritize health over academic activities (Wills & Lawton, 2015). This is why promoting health programs in schools, which include obesity management and prevention programs are essential in Iran (Taghizadeh et al., 2021).While there are some programs available in some schools in Iran, they are not offered in all schools across the country (Ezzeddin et al., 2019; Sayyari et al, 2017). Also reports show that they can only be successful with more support from the government (Taghizadeh et al., 2021).

In the UK, the National Child Measurement Programe (NCMP) measures children's BMI in schools and following the data collection parents of overweight/obese children are informed (Nnyanzi et al., 2016). However beneficial, it seems that this program is not sufficiently successful in the promotion of healthy behaviours and in the prevention of obesity. Thus further actions are still needed (Saxena, 2017; NAO, 2020).

6.9.2.3 Government role

In both countries, the government was considered to play a role in tackling and preventing CO. In this regard, Iranian parents placed some blame on the government for high levels of CO and inactivity of children due to limited policies over fast foods and sweet products as well as paying limited attention to sports and PAs. In line with other studies, parents made some suggestions to be considered by the government regarding improving children's nutrition and promoting their PA (Amini et al., 2014; Kelishadi et al., 2013; 2016; Mohammadpour-Ahranjani et al., 2014; Sayyari et al., 2017). The increasing rates of obesity in Iran as well as changes in people's lifestyles along with nutritional transition (from traditional to fast food), means authorities need to take appropriate actions and strategies to slow down /prevent the rapid rates of CO in Iran (Kelishadi et al., 2013; Khazaei et al., 2017; Rahmani et al., 2014; Sayyari et al., 2017; Taghizadeh et al., 2021).

By contrast, British parents hold a more positive attitude towards government programs and strategies regarding controlling obesity, although some believed additional actions and efforts were needed to help tackle this issue. Although "A plan for action" program aims at reducing CO by half by 2030, it was reported that it seems difficult to achieve without a more focused strategy (Davies, Mytton, & Pawson, 2019). One recommended way to help tackle CO in the UK is for the government to support family-based intervention programs that are provided by local authorities (BDA, 2018; Davies et al., 2019). Increasing the involvement of family was important as these programs have long lasting effects (Epstein, Myers, Raynor, & Saelens, 1998; Towns and D'Auria, 2009).

Considering that the quantitative studies in the previous chapter found that in both countries a large number of parents are not able to accurately perceive whether their child is overweight and has unhealthy behaviours, this might be a potential reason for intervention programs not being successful in managing the high rate of obesity, particularly in the UK. Thus understanding underlying factors for parents' inaccurate perceptions may be beneficial for improving the efficacy of family-based programs in both countries. The following two themes help explain some of the reasons for parents' misperceptions in both countries.

6.9.3 Parents' reactions to CO, activity levels and FMS that undermine change

Parents' reactions to CO, activity levels (high SB and low PA) and FMS of children was a theme in the data, which explains some potential reasons for parents' misperception of their child's weight status, PA, SB, and FMS that undermine change. 'Parental Denial' and 'Nonchalant and Positive Attitudes' towards CO are two subthemes that are discussed below.

6.9.3.1 Parental Denial

Almost all of the parents, across both countries, were aware of the health consequences of CO and were able to name some associated problems, such as heart disease, diabetes, hypertension, and cancer. Parents also were aware of the mental health issues linked with CO, such as low self-esteem, depression, and anxiety. Social isolation and discrimination were also mentioned to be associated with CO (Regber et al., 2013; Wabitsch, 2000). However, studies show that, although parents of overweight children were concerned about obesity in children and believe obesity needs treatment, the majority of parents of overweight/obese children underestimated the weight of their child (Aparícioet al., 2013; Braley, 2016; Pagnini et al., 2007; Southwell & Fox, 2011). Nevertheless, it has been reported that although parents may not recognise their children as being overweight, they are able to realise it in other children that are not related to them (Bayles, 2010; Huang et al., 2007; Tompkins et al., 2015).

One explanation for parents underestimating their child's weight is that they are reluctant to use the term "overweight" or "obese" , due to its negativity, which leads to denial of the condition (Braley, 2016; Pagnini, et al., 2007; Southwell and Fox, 2011). Therefore, in the current study, it was suggested that considering obesity as a negative problem that causes disease, is a reason that some parents may deny its existence in their children. Love and affection of the parents and their wish for their children to be happy and the best in everything compared to other children, might lead to denial. Other possible reasons for denial that were suggested include deflecting responsibility, avoiding blame, as well as avoiding social stigma for themselves and their child (Howe et al., 2017; Mikhailovich & Morrison, 2007; Southwell & Fox, 2011). In fact, denial is a defence or coping mechanism that parents adopt to avoid such feelings

(Katz, 2015; Southwell & Fox 2011). Studies in western countries show that generally the public, including people, media, and the news and even health care providers, believe that CO is the fault of parents, and they are to be blamed for this issue (Braley, 2016; De Brun, McCarthy, McKenzie & McGloin, 2013; Wolfson et al., 2015). In addition, parents of overweight children have reported experiencing being blamed and stigmatised due to their child's eating habits and lack of activity behaviours (Eli et al., 2014; Jackson,Wilkes, & Macdonald, 2007; Southwel & Fox 2011). Similarly, participants in this study, including some who believe their child/children are overweight, blamed parents of overweight children in general. They believed that being blamed or judged by others is a reason for many parents' denial that this problem exists in their children.

Being blamed by others was therefore mentioned as a reason that parents prefer to be detached from the issue and why they would prefer professionals to inform them about their child's weight issue. When parents are blamed and judged by others, they internalize it and blame themselves (Braley, 2016; Wolfson et al., 2015), especially if they themselves are overweight. Self-blaming and feeling ashamed, or a failure, or guilty for the child's weight problems were shown in past research to be the reasons that parents are reluctant to accept obesity in their children (Crandall et al., 2001; Regber et al., 2013). Although mentioned in both countries, denial to avoid being blamed/self-blame, appeared more frequently among British parents.

These findings, might be related to the extent to which parents consider themselves to be responsible for CO. Weiner's social motivation theory states that the cause of a problem affects the attitude towards responsibilities and the emotional reactions to it (Weiner, 2013; Wolfson et al., 2015). Whenever the reasons for a problem seem to be under the internal control of an individual (like the obese children or their parents), the individual is considered to be responsible for solving it. On the other hand, when an individual considers the cause of a problem out of their control, their responsibility is reduced and they seek help and policies from authorities. The sense of responsibility and controllability consequently leads to rejection/denial, and negative emotions (Weiner, 2013; Wolfson et al., 2015). Placing the blame on the victim is a culture-related occurrence, thus regarding the blame for obesity, in individualist cultures, the person/ parent is more to be blamed compared to collectivist cultures (Crandall et al., 2001). The findings of this study suggest that Iranian parents attributed responsibility of CO to parents, schools, and government and thus don't fully blame parents while British parents believed that parents are mainly responsible.

CO is a sensitive and complex subject (Gillespie, et al., 2015) thus blaming parents for their child's weight issue can make parents less motivated to address the issue, resulting in having an adverse impact on CO intervention (De Brun et al., 2013, Wolfson et al., 2015). Therefore, this needs to be considered by health care services/clinics/practitioners that work with parents of overweight children. It is important to address the issue in a way that avoids making parents feel blamed/judged or guilty for their child's weight issue in order to support them for accepting the obesity in children.

As stated earlier one possible reason suggested for parents' denial is to avoid social stigma attached to obesity. According to Weiner's Attribution Theory of Stigmas (1985), individuals' perceptions of the cause and stability of a condition that is stigmatising will influence their judgments and feelings towards the target population (Black, Sokol, & Vartanian, 2014; Braley, 2016). In this regard, obesity stigmatisation is considered to be a “prejudice in which the attribute of being obese or overweight influences one’s expectations, usually in terms of negative character assessments” (Braley, 2016; Lynagh, Cliff, & Morgan, 2015, p. 595). The negative attributes such as laziness, over-eating, lack of motivation, and reduced self-discipline were the social stigmas that make parents reject obesity in their children (Braley, 2016; Howe et al., 2017; Nnyanzi et al., 2016). Parents used denial as a coping mechanism, as was suggested in the findings of the present study. Denial to avoid such labels and social stigma that is attached to CO, was more frequently raised among the Iranian parents, compared to the UK parents. Some qualitative studies in Iran have confirmed the pressure of stigmatization of obese individuals. A study by Amini et al (2014) on overweight students showed that obese students have experienced stigmatization and verbal humiliation regarding their weight not only by their peers but by other people in society including their teachers. Such stigmatization can have adverse impacts on CO treatment, for instance children being stigmatized by their PE teacher can in turn result in a negative attitude towards PE and make them less motivated to participate in PA (Braley, 2016). Although British parents did not talk directly about CO as a social stigma, they indirectly acknowledged it while talking about indicators of an overweight child such as being lazy, overeaters, unsociable etc. This indicates a need for changing people’s attitudes regarding obesity to reduce stigmatization and better address the problem in both countries. Countering the stigma attached to obesity needs to be considered by health care services to improve parents’ acceptance of obesity and optimize family-based intervention programs in both countries.

In both countries, the increased rate of obesity and its normalization, appeared to be another reason for parents' denial of CO (Rietmeijer-Mentink et al., 2013). Based on the theory of visual normalization, obesity dominance leads to the normalization of larger bodies, which is a key factor in underestimation of overweight and obesity (Robinson, 2017). Living amongst overweight people within a society can generally facilitate an underestimation of obesity in ourselves and in others (Hansen et al., 2014; Parkinson et al., 2017; Robinson, 2017). A key issue here is visual adaptation, which is a process in which the stimulus size that a person is accustomed to seeing around (such as body size) directly forms their visual perception of the stimulus' naturalness. It is suggested that the exposure to more obese people can extend the range of body sizes that are perceived to be normal, as the visual norms are shaped by experience (Robinson, 2017). The shift in social norms related to children's body size is proposed to have made a generational shift in parents' perception of children's weight (Hansen, et al 2014; Howe et al., 2017). As such perhaps parents might be unaware of their child's excess weight due to comparing their child with other children (Eckstein et al., 2006; Hernandez et al., 2010). Normalization of obesity affects parents' perception and reinforces their denial, which will affect the efforts to reduce obesity and enhance healthy lifestyle in children (Hansen, 2014).

Although participants in both countries acknowledged that the high rate of obesity among children has normalized obesity, this was reported more by British parents. It was proposed by UK parents in this study that availability of big size clothes for children and even big size school uniforms is a confirmation of obesity becoming more of the norm in this country. One explanation for this finding might be related to the higher rates of CO in the UK (over 30%) compared to Iran (21%) (NAO, 2020; Khashayar et al., 2018) which may result in more normalisation of obesity in the UK than Iran. Some research in the UK has acknowledged that there is a shift in social norms of obesity as well as a shift in parents' perception of overweight in children (Jeffery, Voss, Metcalf, Alba, Wilkin, 2005; Jones et al., 2011). It is evident that countries with higher parent misperception have higher rates of obesity (Binkin et al., 2013), so normalisation of obesity is a key factor that prevents parents from realising obesity in children.

The findings of this study suggest that denial is not just a defence mechanism regarding CO, but also in relation to SB, PA and FMS. Parents know the benefits of PA, so it was suggested in this study that they may use denial to deflect responsibility, avoid blame, or be positive about their children even when they may not be sufficiently active. Therefore, denial, including underestimation of SB and overestimation of both PA and FMS of children, might be methods to provide socially desirable answers (Corder et al., 2010; Grewal, 2013), due to parents' tendency to present themselves and their children as being the best (Bowling, 2002; Regber et al., 2013).

Although underestimation of SB due to denial may be common in the UK, this study also found an alternative potential reaction to SB among Iranian parents was actually overestimation of SB. It was revealed that some parents used overestimation of SB as a strategy to persuade their children to be more active, and some didn't want their active children to be thought of as hyperactive. In other words, due to increased levels of SB of children and the cultural norm being shifted towards a more sedentary lifestyle, an active child may be perceived to be abnormally active and thus children might be labelled as hyperactive (Bentley et al., 2012). This was suggested to be a reason for some Iranian parents to intentionally overestimate their child's SB to avoid labels such as "hyperactive" or "not being polite".

This also might be related to attribution of the responsibility of SB to schools and government. According to Weiner's social motivation theory, by overestimation and by attributing the responsibility to school and government, they might be trying to put pressure on these organizations to support families in reducing SB of children (Weiner, 2013; Wolfson et al., 2015).

6.9.3.2 Nonchalant and positive attitudes towards CO

Nonchalant and unrealistic positive attitudes towards CO have also been reported to undermine parents' perception of obesity in children (De La O et al., 2009). The findings of this study support existing research that illustrated how in certain cultures, chubby or plump children are seen as strong, healthy and a sign of wealth and hence parents are either proud, or at least not concerned (Aparícioet al., 2013; He & Evans, 2007; Jain et al., 2001; Jones et al., 2011). The cultural concept of a healthy child is different in different cultures, where chubby children are more likely to be considered as healthy, than having a weight condition (Gregori et al., 2018; Hochdorn, 2016). In contrast, having slim and thin children is seen as taboo or undesirable in some cultures (e.g. African-American) and represents a society or family with poor health and weakness (Bruss et al., 2005). Except for the cultural norms, the scientific knowledge on health does not accept obesity as a sign of good health (Lobstein, Baur, & Uauy, 2004). In addition, it was also revealed in this study that considering overweight children as cute and attractive is a factor that impacts some Iranian parents' realisation of CO. This notion was also acknowledged by some parents of overweight children, who try overfeeding their children intentionally to raise them chubby. Peoples' preference for having chubby children, due to considering them more attractive than slim children, has also been reported in Middle Eastern countries, and this concept needs to be altered or addressed (Davidson, Thill, & Lash, 2002; Puraikalan, 2018).

In some cases, it was shared by parents that they believe children will "outgrow" obesity as they age, which corresponds to findings of several other studies (Etelson, Brand, Patrick, & Shirali, 2003; Jain et al., 2011; Jones et al., 2011; Maynard et al., 2003). It is believed that as a child grows, PA will be increased and obesity will be reduced (Lydecker & Grilo, 2016; Wolfson et al., 2015). While some believe that children outgrow obesity as they age, previous research shows the opposite; the majority of obese/overweight children will become overweight adults (Davis et al., 2008; Freedman, Khan, Dietz, Srinivasan, & Berenson, 2001). In fact, onset of CO before the age of 8 years is shown to persist into adulthood and to be associated with higher BMI in adulthood compared to obesity beginning in adulthood (Dietz, & Robinson, 2005; Rietmeijer-Mentink et al., 2013).

The positive attitudes to obesity discussed here affect parents' perceptions about CO and may mean parents do not make efforts to reduce their child's weight through healthy behaviours such as reducing SB and increasing PA. There is a need for raising parents' awareness towards what is a healthy weight and body size in children. It was revealed in this study that parent's lack of knowledge on identifying CO is a barrier to tackling CO which needs to be addressed. Various other factors also emerged as barriers in preventing/reducing CO and in promoting healthy behaviours of children. These factors are discussed below.

6.9.4 Barriers to preventing/reducing CO and promoting healthy behaviours

Consistent with other studies, several barriers were identified by parents in this study with regard to preventing/reducing CO and promoting healthy behaviours of children (Lobstein et al., 2004, Mejia de Grubb et al., 2016; Pocock et al., 2010). As supported by other studies, cost of healthy food and time constraints were perceived as the main barriers to eating healthy. In addition, consistent with other studies, the cost of organised activities, lack of time, weather conditions, living in apartments, safety concerns and transport issues were perceived as important barriers to PA of children (Dwyer et al., 2008; Hesketh et al., 2017). Time constraints were mentioned by parents as a key barrier to improving FMS of children which is in line with a study by Roscoe, et al. (2017). Time constraints, in particular, are perceived to get in the way of parents spending more time with their children and involving them in healthy eating and physical activities (Karnik & Kanekar, 2012) especially for working parents and parents with several children.

Some parents believe that these barriers are manageable depending on how much parents care about the health of their children and prioritise healthy eating and exercise which is supported by findings of a systematic review by Pocock et al. (2010). Some believe that organic food is not the only option and recommend that by increasing nutritional knowledge parents can use various cheap yet healthy ingredients to improve their family food. In fact, this confirms the findings of other studies regarding parents' misconception of healthy food as being fresh, organic and homemade which needs to be corrected (Hart et al., 2003). Thus the misperception that healthy food is costly and time consuming, needs to be addressed to encourage parents in providing healthy food and preventing CO (Hesketh et al., 2005).

Likewise, regarding PA, getting involved in free activities like walking on weekends and providing a supportive home environment for activity of children was recommended by parents. While financial constraints have been found in various studies as a barrier to participation in organised activities, the importance of free play and activities was neglected by parents (Pocock et al., 2010; Dwyer et al., 2008). Studies suggest that parents should be encouraged and informed about involving children in free play activities (Dwyer et al., 2008; Roscoe et al., 2017). In addition, as recommended by parents in this study and proposed by other researchers, creating a more supportive home environment and getting more involved in low cost/free activity with children is important for improving children's PA and FMS (Dwyer et al., 2008; Roscoe, et al. 2017). However, considering that some of the barriers to PA might not be manageable by some parents (e.g. managing extra time at home or increasing home space for activity), there is a need for providing feasible and practical strategies to assist parents in promoting PA of their children (Hart et al., 2003; Hesketh et al., 2017; Slater et al., 2010).

Parents' convenience regarding children's diet, PA and SB was revealed to be another barrier. However, parents' preference for having ready-made food, staying at home instead of taking children out, and allowing children to be on screen devices to keep them quiet may be related to time barriers discussed above. For example, parents being tired due to their job and work at home has been reported as a barrier in preventing them from providing healthy food for their family as well as encouraging and improving PA of children (Pocock et al., 2010). Accordingly, parents of children who have a poor diet and/or watch too much TV have reported some degree of feeling guilty. Thus, not being able to overcome these barriers such as time constraints, that are also perceived by some participants to be manageable, may lead to feelings of shame and guilt which then feed into parents' denial of overweight or low activity of their children.

Moreover, consistent with other studies, various child related factors were found to act as barriers to healthy practices (Hart et al., 2003; Hesketh et al., 2005; Mejia de Grubb et al., 2016; Pocock et al, 2010). Children's preference towards eating unhealthy food and snacks, being fussy eaters, being sedentary and spending time on screen were proposed as barriers to eating healthily and being active. Media advertising of unhealthy snacks and peer pressure to eat unhealthily and be inactive were mentioned to sabotage parents' efforts to encourage a healthy lifestyle. This pressure from children is a barrier but the emphasis is again on the need for parents to arrange and manage food and electronic gadgets for children (Wolfson et al., 2015). Parents are advised to change their thoughts that children's behaviours are fixed and unchangeable and thus they need to maintain control over children's food and activity levels (Hart et al., 2003).

There is a need to support parents in applying effective strategies to overcome child related barriers, and as recommended by Hart et al. (2003), a "how to do it" approach may work better than "what to do" (Hart et al., 2003; Heskeath et al., 2012; Slater et al., 2010). In addition, considering the critical role of school in encouraging children to foster a healthy lifestyle (Department of Health and Social Care, 2018), educating children from an early age in school can help parents to overcome barriers such as peer pressure and help them feel more in control of their child's weight and health related behaviours (Hesketh et al., 2005, 2017; Hart et al., 2003). As discussed earlier, parents' sense of control over CO and SB of their children impacts their reaction to it (Weiner; 2013; Wolfson et al., 2015). Thus, by attributing responsibility to child related factors, such as preference or fussiness, they are more likely to accurately perceive the CO or SB of their children, however other factors such as love blindness and tendency to be positive about their children might cloud their perception and lead to denial.

One key barrier which also serves as a significant underlying factor for parents' misperception of CO, PA, SB and FMS was suggested in this study to be parents' knowledge on CO and related healthy behaviours. Although parents were well informed of health consequences of CO and inactivity, there was some lack of knowledge, including identifying obesity and related healthy behaviours. Lack of knowledge among parents is a barrier in addressing the issue of child obesity (Gable & Lutz, 2000). This finding was consistent with findings of other studies; while parents have general understanding and knowledge of the health consequences of obesity, they do not have the in-depth knowledge and understanding on identifying obesity, and its contributors, as well as the strategies to prevent and reduce obesity among children (Etelson, Brand, Patrick, & Shirali, 2003; Hesketh, 2005; Mejia de Grubb et al., 2016; pocock et al., 2010; Rich et al 2008).

Lack of knowledge to identify obesity was reported in this study. Only a few participants were familiar with children's growth charts and the majority used other indicators, such as visual or behavioural signs, to identify CO. This suggests that there are important gaps between clinical definitions and lay perceptions of CO (De La O et al., 2009; Eli et al., 2014; Etelson et al., 2003; Jones et al 2011). The apparent indicators used by the parents were looking at the size of children, considering the fat accumulation around some parts of the body such as face, arms and abdomen, and comparing size of children with other children has been a common method used by parents to identify CO (Jain 2001; Jones et al., 2011). However, due to the increase in the rate of obesity and with obesity becoming more of norm in some societies, the child-size comparison may only be applicable for identifying obesity in extreme cases (Hansen et al 2014; Jain 2001; Jones et al., 2011; Laurent, 2014; Parkinson et al., 2017). Clothes size was another indicator parents used to identify obesity which supports the results of the study by Gillespie et al. (2015). However, though the increasing rate of obesity may impact on clothes sizes (which was found to be the case in UK), this indicator may falsely reassure parents of their children having a normal weight due to them being unaware of the change in clothes sizes as results of CO epidemic (Jones et al., 2011).

Children being active was also mentioned to be a common way for parents to decide whether their child is overweight or not, but this approach can be misleading and could lead to an active overweight child being considered to be of a healthy weight by their parents (Foster & Hale, 2015; Howe et al., 2017; Jain 200; Jones et al., 2011). Consistent with other studies, some of the other indicators suggested by parents in both countries include: overeating, being unsociable or unhappy, being teased/bullied, being less active and lazy, low mobility, feelings of tiredness and lack of stamina during PAs (Braley, 2016; Foster & Hale, 2015; Howe et al., 2017; Jain 2001; Jones et al., 2011; Nnyanzi et al., 2016). Therefore, using non-clinical references to identify obesity emphasized the need to educate parents on how to identify obesity in their children. This is essential since normalization of obesity in societies, means correctly perceiving the child’s weight can become more challenging.

One interesting finding in this regard was that most of the named indicators of CO are those that society holds towards obesity, and these were mentioned in both countries. As discussed earlier, while stigmatization was mostly discussed by Iranian parents, British parents named some stereotypes in the form of indicators of CO which are linked to obesity stigmatization. It might be that British parents were less comfortable to judge people in front of the interviewer compared to Iranian parents (Braley, 2016). This is supported by Braley (2016) who conducted a study comparing people's written comments on social media with face-to-face interviews. The study's findings showed less stigmatization and judgements were attributed to obese individuals by interviewees compared to commenters. This highlights the need to counteract the stigma associated with obesity in societies in order to prevent people from using stereotypes/labels as indicators for obesity realization.

Concerning knowledge on contributors to CO, in general parents showed a higher degree of awareness of the need for a healthy diet than the need for an active lifestyle in order to prevent becoming overweight which supports the findings of the systematic review by Pocock et al. (2010). However, in line with other studies, (Etelson et al., 2003; Genovesi et al., 2005) their nutritional knowledge appeared to be basic (mostly focusing on fast food and sugar consumption). For instance, lack of knowledge on nutritional value of frequently consumed foods, quantity and frequency of food children need to consume, and, as stated earlier, considering healthy food to be organic or costly, were perceived as the main barriers for improving healthy eating. In addition, being unaware of the consequences of unhealthy parental practices and strategies as contributors to obesity (e.g. not restricting unhealthy food, eating allowed in front of the TV, treating children with unhealthy snacks as a reward for desired behaviours), as well as not controlling or monitoring children's food were proposed by parents as other important barriers, which is supported by other studies (Kitzmann et al., 2008; Mejia de Grubb et al., 2016). In contrast, certain nutritional practices and strategies support accurate perceptions of a child's weight status. For instance, Lydecker & Grilo (2016) found that increasing food restriction and monitoring was positively correlated with more accurate perception of a child's weight status. In another study by Foster & Hale (2015) it was found that parents who were more accurate in realising when their child is overweight had more specific knowledge regarding strategies and practices to prevent CO. This highlights the importance of educating parents on different aspects of nutrition as well as related practical strategies.

Likewise, this study found parents' knowledge on PA, SB and FMS is also a barrier to healthy behaviours in children. Studies in both countries show that children are not meeting the recommended PA guidelines, which has affected the rise of CO levels (Fuller et al., 2016; Kelishadi et al., 2010; 2017). Consistent with other studies, the analysis of the current study revealed that in both countries, although parents were aware of health outcomes of PA and adverse effects of prolonged SB, generally they were unaware of the guidelines for their children's PA levels and SB (Bently et al., 2012; 2015; Trigwell et al 2015). Unawareness of guidelines is a barrier to behavioural change as it impacts parents' assessment /perception of their child's PA and SB (Bently et al., 2012, 2015; Corder et al., 2010).

In addition, parents being unable to identify an in/active child was perceived to be another barrier to promoting activity in children. Supporting previous research, an active child was considered to be normal weight/lean, while overweight and overeating were considered indicators for an inactive child (Corder et al., 2010; Eckstein et al., 2006). Considering leanness as an indicator can result in overestimation of PA for both normal weight and overweight children (Corder et al 2011; Watkinson et al., 2010). It is likely that by using this approach, inactive normal weight children will be perceived as having sufficient activity. In addition, for overweight children, as parents mostly underestimate their weight, this can lead to misperception of PA as well as not realizing overeating in their children, which is another indicator being used by parents (Remmers et al., 2014).

As found in other studies, being energetic, not sitting for long periods of time, and being sporty were proposed by parents as indicators of healthy activity levels in children (Bently et al., 2012; Noonan et al., 2017; Pulakka et al., 2014). The opposite signs, such as sitting too much, not moving, being lazy, being unsociable, excess use of electronic devices, including watching TV, and talking about electronic games were mentioned as factors for identifying an inactive child. Using these visual indicators for assessing SB and PA can be misleading. For instance as was discussed earlier, due to a shift towards a more sedentary lifestyle, active children might be perceived as being abnormally active, and thus might be labelled as being hyperactive (Bentley et al., 2012).

A few participants also talked about well-developed FMS as an indicator for an active child. This is in line with the results of a study by Pulakka et al. (2014) who found the quickness of learning new skills, including motor skills, which is an indicator that may help parents realise whether their child is active. Studies in this area are scarce, but contrary to our findings, results of a study by Roscoe et al. (2017) on parents of preschool children showed parents have good knowledge on FMS of children. However, as stated, research in this area is limited and it is clear from the findings of this study that parents don't have enough knowledge of FMS and its role on PA of children. This seemed to affect parents' ability to identify the FMS level of their children. For instance, the majority of parents tried to do this by comparing their children's skills with other children (or themselves). Parents comparing their children's attributes (such as their interests, habits or their body size) with their peers or other children is a common method to identify and assess body habits, eating patterns, exercise habits, and weight status (Laurent et al., 2014). This study adds to the existing literature by suggesting this applies to identifying a child's FMS level too. This highlights a need for improving parents' knowledge as making comparisons can be misleading. Almost all parents in this study believe it is the responsibility of the school to improve FMS and inform parents about the FMS level of their children. This is consistent with results of the study by Roscoe et al. (2017). Thus, to improve the FMS of children and increase PA of children, intervention programs should increase parents' FMS knowledge through adequate support from schools.

Not observing or monitoring activity levels of children at home due to time constraints, other people looking after children, and children being in their bedroom was mentioned to prevent parents from correctly assessing their child's in/activity level and FMS. Parents not monitoring and supervising their child's activity has been reported to be a potential factor in parents' unawareness/misperception of their child's activity. This is a barrier to behaviour change (Grewal 2013; Hedwig, 2009; Robinson et al., 2006) because parents are not able to realize whether their child is active enough, and thus don't feel a need to increase PA of children and decrease their SB (Corder et al., 2010; Grewall, 2013). Therefore, parents are urged to spend more time with their children

(Roscoe, James & Duncan, 2017). However, another barrier to parents assessing their child's activity levels is that they are not totally aware of the PA routine of children when they are in school.

Furthermore, one interesting finding was that not having the chance to observe children sometimes makes parents of overweight children prejudge activity levels and FMS skills of their children (either underestimating or overestimating) which might lead to their inaccurate assessment. In line with other studies, overweight was considered as a 'barrier' to PA participation due to reducing mobility (Akhtar-Danesh, 2011; De Decker et al., 2011; Hesketh et al., 2017; Trigwell et al., 2015). In addition, the possibility of overweight children being teased or bullied by their peers was mentioned in this study to impact their self-esteem which may prevent them from participating in PA, particularly in school (Mejia de Grubb et al., 2016; Pocock et al., 2010). Overweight children having less opportunity to participate in PA in school due to PE teachers prejudging their ability and giving them less opportunity. This was proposed mainly by some Iranian parents. Paying less attention to overweight children by PE teachers can lead to developing a negative attitude towards PA among children and make them less interested to participate in PA (Barely, 2016). Therefore, it is essential that intervention programs encourage teachers to involve overweight children in sports they enjoy in order to increase their self-esteem and participation in PA. Furthermore, there should be more interaction between parents and schools, so parents know about the school-based physical activities of their children (He et al., 2007).

In summation, parents lack of knowledge on children's nutrition, PA, SB and FMS in various aspects such as guidelines, descriptions, definitions, as well as the way in which these factors contribute to children's weight need to be considered in order to improve parents' perception/awareness. Thus, educating parents on all these issues can be beneficial for addressing the issue of parents' misperception of weight and/or related behaviours. Parents' use of visual cues for identifying CO, activity levels or FMS is an important barrier to behaviour change that needs particular attention. Introducing standardized tools to parents, along with educating them on how to monitor/observe the related behaviours in children, might also be beneficial for facilitating accurate perceptions/awareness.

The limitations and strengths of this study will be discussed in chapter seven.

6.10 Conclusion

To conclude, there were some differences found between the views of parents in the two countries, especially relating to attribution of responsibility for CO and un/healthy behaviours, and this may suggest an influence of culture. In both countries certain perceived barriers/external contributors seemed to be considered to sabotage parents' efforts to prevent or manage CO and promote healthy behaviours of children. Additionally, Iranian parents placed a great responsibility on external contributors such as school and government. However Iranian parents' perceptions in this regard may have been magnified as it is suggested by research that parents of primary school aged children play a significant role as well (Hart et al., 2004). Thus, inspiring and helping parents, particularly Iranian parents, to assert their own control over children's healthy behaviours and play their part is essential, while adequate support is also critically needed from authorities and policy makers, especially in Iran. The Iranian government needs to take action by introducing strategies and policies to improve children's diet and activity levels in school and society more generally and support families in this regard. Of course, this might not be the panacea to the issue of CO, as in the UK, CO programs have not been sufficiently successful yet and hence more work is also needed to address this issue in the UK. CO treatment and prevention is complex which needs a multifaceted approach to be addressed (De Giuseppe et al., 2019; Pandita, et al., 2016). It is also a shared responsibility and thus needs efforts from everyone in society including parents, schools, government, local authorities, health and social care sector, industry etc. which requires everyone to play their role (Department of Health and Social Care, 2018; Sayyari et al., 2017).

Parents' denial as a reaction to CO and insufficient activity levels and FMS of children was suggested by participants to be a potential underlying factor for parents' inaccurate perception of their child's weight, SB, PA as well as FMS level. Parents' love blindness and tendency to be positive about their children was suggested as a reason for denial in both countries, but there were also some apparent differences between the countries. For example, regarding SB, it was found that some Iranian parents may actually overestimate (rather than underestimate) their children's SB to encourage them to be more active and avoid labelling such as hyperactivity and impoliteness. Attribution of responsibility for CO and unhealthy behaviours of children to parents was suggested, particularly by British parents, to lead to denial of CO and SB due to attempting to deflect their responsibility. On the other hand, by attributing some responsibility to school and government, Iranian parents seemed to be less pressurized to hold the responsibility for weight problems and SB of children. Avoiding social stigma attached to CO was another reason suggested for denial. This appeared mainly among Iranian parents which may indicate higher levels of obesity stigmatization in Iran.

While normalisation of CO was suggested to cause denial in both countries, it was more predominant in the UK, probably due to higher rates of CO in the UK. Furthermore, in both countries, nonchalant and positive attitudes towards CO, due to CO being considered as a sign of health, wealth or attractiveness (mainly in Iran), as well as due to the notion that children will outgrow obesity were also suggested as possible reasons for parents' misperception of their child's weight.

Various factors such as time, cost, convenience, child's preference and weight, peer pressure, parents' lack of knowledge, and not observing/monitoring children's behaviours were identified as barriers that impact promoting healthy behaviours of children. Parents' lack of precise knowledge on the main contributors to CO, their nutritional knowledge, as well as inadequate knowledge of clinical references to identify overweight children were revealed to serve as factors impacting parents' accurate perceptions of their child's weight in both countries. Likewise, lack of knowledge on PA, SB and FMS and ways to identify them as well as not observing these behaviours in children emerged to impact parents' accurate perceptions of their child's PA, SB and FMS. Parents' lack of knowledge on FMS of children and its association with PA and weight of children in both countries was a particularly novel finding of this study. Considering the results of this study, intervention programs need to consider cultural differences to make family-based obesity management and prevention programs more beneficial. In addition, due to lack of knowledge on identifying obesity in children, along with normalization of obesity, health care services need to improve parents' knowledge in this regard. Additionally, increasing parents' nutritional knowledge including a balanced diet and calorie guidelines, and their knowledge on PA, SB and their guidelines needs to be considered by health care services/authorities worldwide. Furthermore, there is a universal need for raising parents' awareness of FMS skills of children and its role in PA and weight of children in order to empower parents to accurately perceive these skills in their children and understand their importance. Improving parents' knowledge should be a target for all parents, regardless of their child's weight, while children are young in order to prevent and manage CO. Having said that, educating parents alone is unlikely to be sufficient due to the role of external contributors and other barriers (e.g. child preference, time constraints) as they can sabotage parents' efforts. Therefore parents need support and guidance on how to overcome other barriers and successfully translate their knowledge into action. Prevention and management of CO is a complex issue that needs a multifaceted approach and effort of everyone in society in order to be addressed.

Chapter seven

Thesis Overall discussion

The main foci of this thesis was to:

1) examine parents' and children's awareness of the child's weight status, PA, SB and FMS as well as examining children's actual PA, SB and FMS, among normal weight and overweight children in the UK and Iran through quantitative methods.

2) examine the potential underlying factors that influence parents' un/awareness (in/accurate perception) of those variables through an interview-based qualitative study.

7.1 Key findings

The research in the quantitative studies in this thesis found that many of overweight children and their parents in both the UK and Iran underestimated the child's weight status verbally and visually, though there was more accuracy in the Iranian sample. British parents were aware of time spent in PA for children in both weight groups, but British children as well as Iranian parents and their children overestimated the child's PA level. While all Iranian parents overestimated their children's SB, overweight Iranian children were aware of their SB. In contrast, British parents and their children as well as Iranian normal weight children underestimated children's SB. Lastly, regarding FMS, parents of normal weight children in both countries were aware of the FMS levels of children whereas parents of overweight children and all children themselves were not aware of the FMS level of child. Although in both countries overweight children were not aware of their FMS level, British overweight children had a higher level of overestimation than Iranian overweight children.

Children's actual weight status, PA, SB and FMS were also examined. No significant difference was found in weight status of children in both countries. While no significant difference was found in PA of overweight and normal weight British children, Iranian normal weight children had higher PA than overweight children. In both countries overweight children had higher SB and lower FMS than normal weight children. Comparing the two countries, it was also found that British children had higher PA and SB than Iranian (for both weight groups) while no difference was found on their FMS level.

The research in the qualitative study revealed that in both countries parents are considered mainly responsible for CO and un/healthy behaviours of children, however Iranian parents, felt the responsibility was shared with school and government as well. Thus Iranian parents perceived they had less control over CO and inactivity of children compared to British parents.

Various underlying factors were suggested by participants in the qualitative study to impact parents' misperceptions. One factor was 'denial' as a parental reaction to CO, and low activity levels and FMS of children. Denial was thought to be related to parents' love blindness and deflection of their responsibility (for CO, low PA and FMS and high SB), avoiding social stigma attached to obesity and due to the normalisation of obesity in society. Denial to avoid the social stigma attached to CO was raised mainly among Iranian parents. Denial due to normalisation of obesity, as well as to deflect their responsibility, was raised mostly among British parents. Regarding SB, in contrast to British parents' denial of high SB (i.e. underestimation), some Iranian parents suggested parents may overestimate their children's SB as a strategy to encourage children to be more active, to avoid labelling their children as 'hyperactive' and also to persuade schools and government to support them to increase activity levels of children. Nonchalant and positive attitudes towards CO (e.g. CO being a sign of health or that children will grow out of it) was another parental reaction to CO that was suggested to potentially cause parents' misperception of their child's weight in both countries.

Finally, several perceived barriers that hinder behavioural change and the prevention and/or reduction of CO were highlighted in both countries. The suggested barriers are; time, cost, convenience, parents' lack of knowledge, not observing children, child's preference and weight as well as peer pressure. In particular, lack of knowledge on nutrition, PA, SB and FMS as well as lack of knowledge on identifying overweight, in/active children and the FMS level of children were key barriers raised by participants which were suggested to serve as underlying factors for parents' inaccurate perceptions.

As discussed in chapter one, according to the Transtheoretical Model (TTM)/ stages of change, awareness of the issue (e.g. related to this thesis weight problem, low PA, FMS and high SB) is critical and initial step for behaviour change (Haas & Nigg, 2009; Prochaska & DiClemente, 1983; Prochaska &Velicer, 1997). While the findings of this research support this, the explored underlying factors for un/awareness in this research may also explain why when awareness is available it is not enough for changing behaviour. For example, awareness is necessary to move beyond the pre-contemplation stage but more than this is likely to be needed to move beyond the contemplation stage (Driskell et al., 2008; Sealy & Farmer, 2011). As discovered in this thesis, consideration of other factors such as addressing perceived barriers, including those related to culture, may be important for interventions aiming to assist movement through different stages of change in accordance with the TTM."

7.2 Weight status awareness

Many British and Iranian overweight children and their parents misperceived weight status of the child by underestimating. This is supported by studies across the world (Akbari et al., 2006; Eckstein et al., 2006; Garrett-Wright, 2011; Maynar et al., 2003; Muhammad et al., 2008; Park, 2017; Parkinson et al., 2017; Pakpour et al., 2011; Rietmeijer-Mentink et al., 2013; Sarrafzadegan et al., 2013; Tompkins et al., 2014). Factors such as age and gender (both children's and parents'), parents' BMI, parents' personal experiences, parents' education level and health literacy are demonstrated to influence parents' misperception (Chan, & Wang, 2013; Eckstein et al., 2006; Garrett-Wright, 2011; Manious et al., 2015; Maynar et al., 2003; Tompkins et al., 2014). However, other studies did not find any significant relationship between the above-mentioned factors and parents'/children's misperception (Baughcum et al., 2000; Boutelle et al., 2004; Doolen et al., 2009; Maynard et al., 2003; Polfuss & Frenn, 2012; Town & D'auri, 2009). Our qualitative study acknowledged the possible impact of some of these variables (e.g. parents' BMI and obesity knowledge) on parents' misperception of their child's weight, adding some support to the current literature.

Parents' lack of knowledge on contributors to CO and identifying overweight/obesity were suggested by participants to be an underlying reasons for misperception. Parents' lack of knowledge on different aspects of nutrition including lack of knowledge on the effect of unhealthy practices and strategies (e.g. rewarding children with unhealthy snack), was suggested to be a key underlying factor affecting parents' misperception of their child's weight. This supports other recent research (Foster & Hale, 2015; Lydecker & Grilo, 2016; Mejia de Grubb et al., 2016). This finding emphasises the need for educating parents on all aspects of nutrition.

In line with literature, parents' lack of knowledge on identifying overweight was suggested by participants as a key barrier for realising overweight in children in both countries (De La O et al., 2009; Eli et al., 2014; Etelson, 2003; Jain et al., 2001; Jones et al., 2011). It emerged that parents use some visual and behavioural signs such as child's appearance, activity level, eating habits, being sociable etc. to identify CO. The apparent visual indicators used by the parents were looking at the size of the child and considering the fat accumulation around some parts of body such as face, arms and abdominal (Jain 2001; Jones et al., 2011). Results of the quantitative studies (chapter 5) showed that Iranian parents/children had better accuracy than their British counterparts in identifying visually and verbally whether their children are overweight. This might be related to Asian people, including children, having more abdominal fat compared to white or non-Asian people (Hsu et al., 2015; Luke, 2009). The qualitative study (chapter 6) suggested, visual appearance, particularly abdominal fat, is perceived by parents as a sign of being overweight. Therefore Iranian parents may realise CO more than British due to looking at their children's abdomen, which according to previous research might be bigger than in British children. Related to this, studies across the world show that varying degrees of parents' misperception of their children's weight are related to the effect of culture and the country of residency (Binkin et al., 2013; Hochdorn et al., 2018, Lundahl et al., 2014; Manios et al., 2014; Park, 2017; Rietmeijer – Mentink et al., 2013; Robinson et al., 2015; 2017). Therefore, future cross-cultural studies need to consider the difference in body composition of people and the methods parents use to identify obesity to better understand parents' misperception of their child's weight in different cultures and countries.

The use of the visual tool in the quantitative studies produced more accurate perceptions in both countries compared to the verbal tool. Factors such as normalisation of obesity, negative connotations of obesity as well as social stigma associated to CO are proposed to contribute to such results (Binkin et al., 2013; Hochdorn et al., 2018, Hussin et al., 2011; Manios et al., 2014; Park, 2017; Rietmeijer – Mentink et al., 2013; Robinson et al., 2015; 2017). The impact of these factors on parents' misperception were better understood by the qualitative study in this thesis. In fact, it was suggested by participants that normalisation of obesity, love blindness and avoiding social stigma, along with parents deflecting their responsibility due to their parenting style or due to parents being overweight themselves can result in denial of CO perhaps as a coping mechanism used by parents. While these factors may be some of the reasons for parental denial in both countries, there were differences in parents' views regarding denial.

The difference in attribution of responsibility for CO and the role this may play in the accuracy of parents' perceptions of a child's weight in the two countries is a novel finding from our qualitative study. It was revealed that Iranian parents attributed the responsibility of CO and unhealthy behaviours of children to parents, school and government while British parents mainly attributed this responsibility to parents. Thus, if British parents are in denial this may be due to deflecting their responsibility. In contrast, believing the responsibility is shared, Iranians may be more likely to admit their child's weight problem and unhealthy behaviour, thus explaining why Iranian parents had more accuracy in their perceptions of weight status than British parents in the quantitative studies. Attributing some responsibility for CO to external contributors may reduce Iranian parents' sensitivity to categorise their child as overweight. This can support our suggestion in the quantitative chapter that Iranian parents having higher accuaracy than British parents might be due to them being less sensitive in considering their child as overweight compared to British parents, although social stigma attached to CO was an issue raised more by Iranian than British parents.

Normalisation of CO serving as potential reason for parents' misperception of their child's weight (Eckstein et al., 2006; Maximova et al., 2008; Raquel et al., 2010) was also supported by the qualitative results of this thesis, especially for British participants who raised this most often. In line with other studies, it was revealed that parents comparing a child's body size with other children is a method they use to identify overweight in children in both countries (Jain 2001; Jones et al., 2011). Additionally, availability of larger size clothes for children was an issue mainly raised by British parents. These factors, along with higher rates of obesity in the UK (compared to Iran), suggested that CO is more normalised in the UK and this could lead to more parents not being able to identify or denying CO and thus prevent them from realising that their child is overweight or obese.

The notion that nonchalant and unrealistic positive attitudes towards CO leads to misperception of CO was strengthened by the findings in the qualitative research. Cultural and behavioural factors linked to ethnicity are considered to have a significant influence on a mother's misperception of her child's weight status (Gualdi-Russo, 2012; Tompkins et al., 2014). For instance, plump/chubby children in some cultures (African-American, Hispanic, and Asian) are considered healthy and being plump is preferred or accepted as a norm in society. This is reported to be deep-rooted within parents and a reason for an underestimation in identifying that children are overweight (Aparícioet al., 2013; He & Evans, 2007; Jain et al., 2001; Mejia de Grubb et al., 2018; Park, 2017). In the qualitative research in this thesis, this deep-routed cultural bias was also evident in the Iranian participants, although it also exists in the UK within certain cultures as the UK is a multi-cultural country. One more factor supported, by our qualitative study was the belief by parents in both countries that children will outgrow obesity.

Results of the quantitative studies also showed overweight children underestimated their own weight in both countries while underestimation was higher for British children using both verbal and visual tools (54.5% vs 85.2% misperception for British children and 28.9% vs 51% for Iranian children respectively for verbal and visual tools). In addition, children's misperception in each country was found to in line with their parents' misperception. One potential reason, as suggested by previous research, is the influence of parents' perception of their child's weight on children's perception of their weight (Cheng et al., 2016; Huang et al., 2009). The qualitative study suggested some underlying factors for parents' misperception in the two countries, and some of these factors might also apply to children due to the influence of parents' perception. Nevertheless, future qualitative studies with children are needed to further examine the underlying factors impacting their self-weight misperception.

7.3 PA, SB and FMS awareness

Regarding PA, the research found that British parents are more aware of their child's PA compared to the Iranian participants who overestimated their child's PA. A potential reason as discussed in the quantitative chapter, is that this may be related to differences between the two countries regarding the actual level of PA in children. This was higher amongst British children. Such results, particularly regarding Iranian parents' overestimation, was suggested by participants in the qualitative study to be related to parents' being in denial about low PA. For example, they may want to provide socially desirable answers and present themselves and their children in the best light (Bowling, 2002; Corder et al., 2010; Grewal, 2013; Regber et al., 2013). Results revealed that in both countries, participants believed that parents tended to deny low levels of their children's PA due to several reasons: a tendency to be positive about their children, being aware of the health benefits of PA, deflecting their responsibility and feeling guilty or not wanting to be blamed.

Iranian parents also complained about the low levels of inclusion of PA in school, PE classes being commonly cancelled or replaced with other subjects and a lack of communication between school and parents in this regard. However despite the fact that Iranian parents proposed that their children have low level of PA in school, results of study 2 in Iran showed that the majority of parents overestimated PA in their children. Thus based on the findings of our qualitative study, one potential reason for this, might be related to low level of communication between schools and parents regarding PE sessions. It is likely that although in general Iranian parents are aware of low level of PA of children in school they still take into account children's PE sessions in school as they are not aware if sessions have been canceled or replaced.

In contrast, it seems that there is good communication between British parents and schools regarding PE sessions and PA of children. The majority of British parents believed schools are doing well in terms of the duration and frequency of PA of children. In the UK, promoting PA of children in schools and raising parents' awareness of the importance of PA of children are part of UK government plan for addressing CO (DHSC,2018; RSPH, 2015). There are various intervention programs in schools for increasing PA of children that, as findings of qualitative study revealed, parents might be aware of. Thus this might have contributed to British parents' awareness of PA of their children in study 1.

However, PA is not just about what children do in school, not observing children's PA outside of school, in part due to time constraints, as suggested by parents in both countries, is also a potential reason for misperception of children's PA. This might also explain why Iranian parents overestimated PA of their children in study 2 as their children spend less time at school and spend more time at home compared to British children.

In the qualitative study, parents' lack of knowledge in identifying in/active children was revealed to be a potential barrier to accurate perception of PA and SB. In both countries, children being slim/lean was an indicator that a child was active (Eckstein et al., 2006; Corder et al., 2010). These findings, however, don't fully support the results of our quantitative studies which found that, although many Iranian parents with overweight children were accurate in identifying obesity, they tended to overestimate the amount of PA that their children engaged in. On the other hand, the majority of British parents perceived their overweight children to be in the normal weight category, though they accurately perceived PA.

Concerning SB, a novel finding of this research was that Iranian parents overestimated their child's SB while British parents underestimated the child's SB. The qualitative study revealed that Iranian parents were more concerned than British parents regarding their child' SB. These parents believed that children's activity level is low both in school and at home. Living in apartments, and children spending too much time on their homework were perceived by parents to contribute to high levels of SB of Iranian children. Iranian parents' overestimation was suggested by participants to be a deliberate strategy for encouraging children to be more active but also to avoid labels attributed to active children such as impolite or hyperactive (Bentley et al., 2012). In addition, high levels of SB in school due to the emphasise on academic achievements and paying less attention to activity levels of children was criticised by Iranian parents and they consider the school and government to be responsible for high SB of children. Therefore, considering Weiner's social motivation theory, it is also possible that attributing responsibility for activity levels to schools and government is a way of encouraging these institutions to increase activity levels for children (Weiner, 2013; Wolfson et al., 2015).

On the other hand, although British parents expressed their concern for increased SB of children compared to the past, they did not raise the issue of high SB of children in school. Their main concern was SB related to electronic devices at home. Children's low PA and high SB was considered by British parents to be mainly the responsibility of parents. Therefore, underestimation of SB by British parents in study 1 may be related to denial and providing socially desirable answers as these issues were mainly raised by British parents in the qualitative study. Underestimation of SB due to providing socially desirable answers has been reported in other studies (Grewal, 2013; Bowling, 2002; Regber et al., 2013).

Not observing children during the day is another possible explanation for parents' unawareness of SB of children (Colley et al. 2012; Grewal, 2013; Robinson et al., 2006).This was supported by the findings of our qualitative study where not having the chance to observe children at home (due to parents' time constraints) and at school was perceived in both countries to prevent parents from accurately perceiving SB of children. Considering that Iranian parents, as stated earlier, were concerned about high SB of children both in school and at home, not observing children might have resulted in overestimation. Parental concern regarding TV viewing time of children has been reported by some studies to result in their overestimation of the reported time (Pearson et al., 2011). In contrast, British parents, as mentioned previously, did not appear to be so concerned about SB of children, particularly in school. Children in the UK spend more time in school than Iranian children, and thus it is likely that British parents assume their children are less sedentary in school compared to the reality. Comparing SB of children in both countries showed that British children had higher SB than Iranian children.

Considering children's awareness, results of the quantitative studies showed in both countries normal weight and overweight children overestimated their PA. For SB all British as well as normal weight Iranian children underestimated their SB while overweight Iranian children were aware of their SB. Although the qualitative study did not examine why children's perceptions are not accurate, the views of parents may suggest why overweight Iranian children are aware of their SB. As discussed earlier, Iranian parents were concerned regarding SB of children and suggested they may overestimate as a strategy to encourage their children to be more active. Thus, considering that SB of overweight children was higher than normal weight children, it is likely that Iranian parents emphasise this more and then Iranian children are more aware of being sedentary.

Finally, regarding FMS, the quantitative studies showed that parents of normal weight children in both countries are aware of FMS levels of their children while parents of overweight children were not aware. The findings from the qualitative research did not suggest why there was such differences in parents' perceptions between two weight groups. The qualitative findings instead may help to explain a lack of awareness across all children but not necessarily why this only occurred in the overweight group. As suggested by parents in the qualitative study, denial of poor FMS skills as well as parents' tendency to be positive about their children may cause overestimation. Furthermore, various barriers to improving these skills in children were suggested by parents as factors that may lead to parents' inaccurate perception of children's FMS. Lack of knowledge on FMS was the main reason suggested by participants for parents not being able to accurately identify children's FMS levels. In contrast to our findings, a study by Roscoe et al. (2017) found that parents of pre-schoolers had good FMS knowledge and understood the definition of FMS. In contrast, we found a lack of knowledge on all aspects of FMS including definitions, descriptions, and methods to identify good/bad FMS.

In particular, parents' difficulty in identifying good/poor FMS in children was suggested by participants in the qualitative study as a key barrier to awareness of a child's FMS level. Comparing their children's skills with others (peers, friends, themselves) was a key method used by the majority of parents in both countries. However, this finding doesn't support the results of the quantitative studies for normal weight children as in both countries parents of normal weight children were aware of their child's FMS level. Nevertheless, in our quantitative study parents actual FMS knowledge was not explored. Thus, future studies should consider this when comparing both weight groups.

In addition to parents' lack of knowledge, other barriers such as not observing children, parents' time constraints and weight status of overweight children were proposed to lead to inaccurate perception (either underestimation or overestimation). Although the qualitative findings did not suggest why parents of overweight children in the quantitative studies were not aware of their child's FMS, some of these barriers may help to explain it. In both countries overweight children's weight was perceived by participants to be a barrier to their awareness, as a child being overweight may lead to parents just assuming she/he is not good at some of these skills. On the other hand, sometimes parents may perceive their overweight child to be good at some skills, but due to their weight their level of skills may actually be quite poor. This supports the suggested explanation in the quantitative chapter regarding the impact of overweight status and age of children on their FMS (Bryant et al., 2014; Okely et al., 2001; Stodden et al., 2008) and its impact on their parents' awareness (Jones et al., 2011). It was proposed that as overweight children age (10 years old in our sample) their parents might be more aware of their FMS due to them facing more difficulty in their skills. Younger children (9 years old) face less difficulty, which might be less obvious to parents. Thus, parents misjudging their overweight children's FMS level in both countries might be related to the children's weight-related sport abilities and their age.

The qualitative findings revealed that in both countries parents believed that they need to be educated about FMS skills of children in order to be able to improve them. In addition, in both countries, parents expressed a desire for more interaction between parents and school in this regard. However, parents believed that school has the main responsibility for improving these skills due to barriers such as time constraints that are perceived as not manageable by some parents.

Regarding children's awareness of their FMS level, in both countries children were not aware of their FMS skills, but as results of study 3 showed, overweight British children had greater overestimation. This difference, as some Iranian parents proposed in the qualitative study, might be related to the possibility of overweight Iranian children being less involved in PA in school due to PE teachers prejudging their ability. Thus children might feel less competent in their FMS compared to British overweight children.

7.4 Limitations

As with all research, the findings of this thesis have some limitations. One limitation is that participation in both quantitative and qualitative studies was self-selected (voluntary), and as such, the participants may have already been interested in the topic which may have resulted in the possibility of parents tending to provide socially desirable responses. In addition the self-selected sample may limit the generalizability of the quantitative results (Bentley et al., 2015). This might have also resulted in higher PA level of children in quantitative studies conducted in both countries, due to potential ceiling effect (Stavnsbo et al., 2020).

A further limitation is the sample sizes in both countries. In the quantitative studies, particularly for the overweight group, numbers were small which was the reason why overweight and obese were combined. Future studies should try to include a larger sample size, as one possible important limitation when combining overweight and obese groups might be that potential differences between these separate groups have not been considered. Even though overweight and obese categories were combined, it was still a sample size (n=27 UK, n=47 Iran) which again makes generalizability of the results limited. Therefore future studies need to consider collecting data with bigger sample sizes. Nevertheless, the small numbers of overweight and obese children in this research represent the percentages of overweight and obese in the areas that data was collected in both countries (TL, 2021; isna, 2021). Considering that the overweight sample was bigger for Iran (due to recruitment being easier in Iran and people showing more interest in participation), this might have impacted the findings. Furthermore, as a result of the small sample size it was not possible to examine gender or age differences. Gender of children is shown to affect both parents' and children's perceptions as well as awareness of PA, SB and FMS level (Clark et al., 2016; Corder et al., 2010, 2012; Grewall, 2013; Jones et al., 2010; Liong et al., 2015; Morano et al., 2011; Southall et al., 2004; Utesch et al., 2018). Therefore, in the future we would like to consider the age and gender of children while examining actual and perceived PA, SB and FMS level of children.

Similar limitations applied to the sample size of parents. The number of fathers who participated in the quantitative studies was low (n=15 UK, n=29 Iran) and therefore it was not possible to compare fathers' and mothers' responses. The same limitation applies to the qualitative study. Although it was intended to have both fathers' and mothers' perceptions, the majority of participants who agreed to participate in this study were mothers, which prevented us examining fathers' perceptions. Studies show that compared with mothers, fathers are less accurate in assessing their child's weight status (Jones et al., 2011; Towns & D'Auria, 2009). Furthermore, it is shown that fathers have a more permissive parenting style regarding SB (particularly screen viewing) and eating habits of children (Lindsay et al., 2018; Mejia de Grubb et al., 2016; Pocock et al., 2010). Therefore, fathers' perceptions and understanding of CO and healthy behaviours of children could be beneficial in improving family-based interventions in future studies. Another limitation regarding both quantitative and qualitative studies is failure to examine parents' BMI which is due to missing data on reported height and weight by parents. Considering that diet is an important contributor to CO, not examining eating awareness in quantitative studies was another limitation which is suggested for future studies. However, parents' knowledge and awareness of eating behaviours of children was considered in the qualitative study of this thesis.

A further limitation regarding quantitative studies in both countries is that regarding PA intensities, MVPA and SB were considered for comparison and light activity was not examined. This is while; light activity can increase physical activity energy expenditure, health outcomes of light activity are reported and replacing this low energy activity with SB of children is also suggested (Collings et al., 2014; 2015; Kwon, Janz, Burns, & Levy, 2011). In addition, there is lack of study on examining impact of culture/ethnicity on light activity of children (Eyre et al., 2013). Considering that in both countries studied in this thesis, there were differences in MVPA and SB of children, thus it is likely that their light activity might have differed as well. Therefore, future cross-cultural studies should also consider examining light activities of children. Another limitation in regard with assessing PA intensities is that the waking hours were standardized between all children (from 7am to 8pm) which might have affected the outcome particularly for SB of children. Future studies should consider using algorithms for assessing sleep time (Van Hees et al., 2015; 2018) to have more accurate assessment of SB of children. However the waking hours that was considered in this thesis is based on average sleep onset, and offset from previous research as well as pilot studies in both the countries.

An additional limitation is related to the anthropometric measurement of children. The limitation that applies to our qualitative study is that children's weight and height was not measured by the researcher due to the parents' lack of time to accompany their children for a measurement appointment and the difficulty of having both parents and children attend at the time of the parents' interview. These details were instead requested from parents but as some parents did not provide the information, it was not possible to compare the views of parents with overweight children and the views of parents with normal weight children in each country. Objective measurement could have permitted better interpretation of the findings, particularly in understanding underlying factors affecting the misperception of their child's weight in parents of overweight children. Future research should consider this as there might be interesting differences between what others think about the parents of overweight children compared to the parents of overweight children themselves. Nonetheless, as some parents indicated they have overweight children (although this was only their perception) their message somewhat validated the findings of the study as it was same message presented by other parents who participated.

The use of anthropometric measurement was a strength of the quantitative studies. However, considering the difference between White and Asian children in abdominal obesity (Shah et al., 2020), and that parents in the qualitative study proposed a big tummy is a method they might use to identify obesity, it might have been useful to measure the waist circumference of children and to examine the impact on parents' perception of their child between the two countries and/or different cultures. This was not considered in this study as body fat percentage (BF%) was measured. Nevertheless, due to some missing data for BF% of Iranian children, (it was not allowed in one school in Iran) it was not possible to compare two countries' data, which is another limitation of this research.

One more limitation is that British participants in both the quantitative and qualitative studies were predominantly, though not exclusively, White British which made it difficult to examine the effect of various ethnicities and cultures on the variables of the study in the UK. Considering that UK is a multi-cultural country, studies are needed to examine to what extent culture and ethnicity impact on perception. However, having predominantly white British participants is representative of the population of the borough that participants were required (Local Plan Key Facts, 2020) and also allowed for comparisons between two ethnicities across two countries. Finally, as the sample in both countries were from middle SES, generalizability of results to all SES groups might be limited. Future studies are recommended to consider collecting data from diverse SES so that the results can be generalized to a wider population.

7.5 Strengths

The main strength of this research is the nature of the design; the cross-cultural design along with adopting mixed methods to examine CO, PA, SB and FMS, which are variables that have never previously been studied together. In addition, there is an innovation in comparing the two specific countries which adds context to the current literature. This research is the first of its kind to examine parents' and children's awareness of the children's weight, PA, SB and FMS as well as parents' views on those variables between a developed and a developing country (located in Middle-East).

Another strength and innovation from the quantitative studies is the measurement of the variables: firstly the accelerometers objectively assessed children's PA and SB, secondly perceived competence questionnaires for parents and children were matched to the TGMD-2 skills that were tested for measuring actual FMS of children, and finally perception of weight was both verbally and visually assessed.

A further strength of this research was having both children and their parents participate. This enabled us to examine the accuracy of their perceptions/awareness. Studying this in both groups is important in addressing children's behavioural change and CO.

Considering the qualitative study, this adds to the limited qualitative literature which seeks to understand, and ultimately address, prevent and manage CO. This analysis provided context and insight to previous research, while some findings demonstrated that there is a need for deeper examination in future studies. For example, further research is recommended in both the areas of parental styles and shifting cultural norms in relation to CO as well as in the structures of school and governmental systems across Western and Asian countries. A further strength of this study was the novelty of exploring parents' views on FMS of children. To the best of our knowledge there is only one study available which explores this area but this focused on parents of preschool children. Furthermore, this is the first study to examine and compare parents' perception of FMS of children in two different countries. Considering both similarities and differences in parents' views on CO and healthy behaviours of children in two countries, findings provide direct insight from personal accounts and perceptions of the target population, making an excellent foundation for future research aimed at examining parents' perceptions of children's weight status PA, SB and FMS for addressing CO worldwide.

7.6 Practical implications of the study

The findings of this thesis contribute to a better understanding of the mechanisms surrounding parents' and children's awareness of children's weight status and health behaviours (SB, PA, and FMS). In addition, the research provides us with evidence-based findings which could contribute to interventions, policies, pilot projects, training programs and other services for managing and preventing CO and for promoting healthy behaviours in children.

Considering that in both countries CO is increasing and the available strategies have not been fully successful yet, there is a need to further tackle CO and improve healthy behaviours of children. A key suggestion from this research is that in both countries more attention could be paid to family focused intervention programs. Due to some of the differences found between the two countries in the qualitative study, such interventions need to be tailored to different countries and cultures. The intervention programs would initially need to improve parents' and children's awareness of the child's weight and healthy behaviours. There is a critical need for educating parents on all aspects of CO and related behaviours such as nutrition, PA, SB, as well as FMS, including descriptions, definitions, guidelines and methods to identify obesity and un/healthy behaviours. Educating parents while their children are in their early stages of life should be considered as it can better prevent CO.

In addition, the findings from the quantitative studies suggest that awareness in some areas was not necessarily an issue. For example, although past research tends to show lack of awareness/inaccurate perceptions, in study 1 British parents were found to be aware of their child's PA levels. Thus even where there is awareness, the findings of the qualitative study suggest various barriers that impact parents' efforts to improve healthy behaviours of their children to prevent and manage CO, such as time, cost, convenience, and child preference and peer pressure. Thus as well as increasing awareness, various barriers which parents might face need to be taken into account when designing intervention programs. There is a crucial need for providing feasible strategies for parents in guiding them on how to overcome such barriers. Considering the impact of Covid-19 on reducing PA and increasing SB of children and the concern that these changes in activity patterns of children might become permanent and lead to increases in CO (Dunton, Do & Wang, 2020; Stockwell et al., 2021), supporting parents is more important now than ever. To better support parents in promoting healthy behaviours of children, future studies are also recommended to examine whether Covid-19 has created different/new barriers for parents.

Another implication from the current research is that parents' may be in denial about CO and unhealthy behaviours in children and the reasons for denial may vary in different countries and cultures. Intervention programs, therefore, need to consider how to tackle the issue of parental denial and the factors underlying this in order to better support families. For instance, to encourage parents to admit their children's weight problem there is a need for societies to counteract the social stigma attached to obesity. While it is important to make parents feel less stigmatised about CO it is also critical to avoid the culturally influenced ideas that CO is normalised, makes children strong/healthy or that they will grow out of it.

However, treatment and management of CO is a complex issue so it is not all about placing the responsibility on parents through improving family–based programs, but it is a shared responsibility. Besides improving family based programs other sectors need to play their role too in supporting children and families and providing conditions that support healthy behaviours.

Schools should also play a leading role in improving health behaviours of children. They could set a positive environment for children to practice healthy behaviours such as eating healthier (through providing healthy food/snacks) and being more active (through promoting PA of children). They also have the potential to sensitively enhance children's awareness of weight and health behaviours through educating them about obesity and healthy behaviours from an early age. This should also include all parents regardless of their child's weight. These strategies particularly need to be considered by Iranian school authorities, due to the lack of school-based intervention programs in Iran.

A further implication of the findings is that more interaction is needed between parents and schools in both countries regarding activity levels and FMS of children. Parents need to be made more aware of activities that children participate in when they are in school. In particular, parents need to know more about FMS. In addition, government and councils need to ensure that there are trained PE teachers in primary schools and as adequate time for PE in the curriculum is paramount in order to improve quality of PE sessions and consequently FMS of children.

Finally, compared to British parents, Iranian parents seemed to attribute greater responsibility for treatment and prevention of CO and unhealthy behaviours of children to the school and government. Absence of effective intervention programs in Iran has been reported in past studies which highlight a need for a comprehensive and multifaceted approach and beneficial intervention programs (Ezzeddin et al., 2019; Mohammadpour-Ahranjani et al., 2014; Sayyari et al, 2017; Taghizadeh et al., 2021). Policies and strategies to tackle and prevent CO in Iran should also be considered by Iranian authorities. On the other hand, while UK parents place less blame outside of themselves (e.g. school or government), due to CO remaining high in the UK despite availability of various policies, strategies and programs, more work also needs to be done (some of which is being planned) by the UK government.

7.7 Conclusion

The findings of this thesis established that parents' awareness of the weight status, PA, SB and FMS of their children is important for improving health behaviours of children and preventing and tackling CO. The findings also identified various reasons for lack of awareness that need to be tackled. However, awareness is not always a problem and CO still persists. Thus, increasing awareness is crucial but is not a panacea. The findings suggested various barriers to improving health behaviours of children and preventing and managing CO which some of these barriers might be impossible to manage or overcome without help. Parents need the support of other agencies such as governments and schools. Assisting parents to overcome barriers might also be beneficial for improving their awareness where a lack of awareness exists. As there were differences in findings between the two countries family based intervention programs to prevent and treat CO need to be tailored to countries and cultures. The results of this thesis may therefore be useful for informing future obesity prevention and management intervention programs as well as improving the efficacy of available programs. In addition, considering that CO treatment and prevention is a complex multi-disciplinary issue, along with barriers that families face in this regards, placing the responsibility only on parents is not useful in addressing the issue of CO. This is a shared responsibility which needs everyone in society to play their roles.

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Appendixes

Appendix A: Ethical approval letters for the research

Middlesex University London

London Sport Institute REC

The Burroughs
Hendon
London NW4 4BT

Main Switchboard: 0208 411 5000

02/02/2017

APPLICATION NUMBER: 1262

Dear Fatemeh Fazeli

Re your application title: Physical activity, weight status and fundamental movement skills

Supervisor: Ilzi Nicola Rhonda Bryant Cohen Payne

Thank you for submitting your application. I can confirm that your application has been given approval from the date of this letter by the London Sport Institute REC.

Please ensure that you contact the ethics committee if any changes are made to the research project which could affect your ethics approval.

The committee would be pleased to receive a copy of the summary of your research study when completed.

Please quote the application number in any correspondence.

Good luck with your research.

Yours sincerely

Chair Dr Rhonda Cohen

London Sport Institute REC

Page 1 of 1

Middlesex University London

London Sport Institute REC

The Burroughs
Hendon
London NW4 4BT

Main Switchboard: 0208 411 5000

25/07/2018

APPLICATION NUMBER: 4252

Dear Fatemeh Fazeli

Re your application title: Parents' perception on childhood obesity

Supervisor: Lizi Bryant Rhonda Cohen NicolaPayne

Co-investigators/collaborators:

Thank you for submitting your application. I can confirm that your application has been given approval from the date of this letter by the London Sport Institute REC.

Although your application has been approved, the reviewers of your application may have made some useful comments on your application. Please look at your online application again to check whether the reviewers have added any comments for you to look at.

Also, please note the following:

1. Please ensure that you contact your supervisor/research ethics committee (REC) if any changes are made to the research project which could affect your ethics approval. There is an Amendment sub-form on MORE that can be completed and submitted to your REC for further review.

2. You must notify your supervisor/REC if there is a breach in data protection management or any issues that arise that may lead to a health and safety concern or conflict of interests.

3. If you require more time to complete your research, i.e., beyond the date specified in your application, please complete the Extension sub-form on MORE and submit it your REC for review.

4. Please quote the application number in any correspondence.

5. It is important that you retain this document as evidence of research ethics approval, as it may be required for submission to external bodies (e.g., NHS, grant awarding bodies) or as part of your research report, dissemination (e.g., journal articles) and data management plan.

6. Also, please forward any other information that would be helpful in enhancing our application form and procedures - please contact MOREsupport@mdx.ac.uk to provide feedback.

Good luck with your research.

Yours sincerely

Page 1 of 2

Appendix B: Cover letter/ Debriefing sheets and informed consent form, (Study 1 and Study 2)

Participant information sheet

Middlesex University
London Sport Institute

MIDDLESEX UNIVERSITY

PARTICIPANT SHEET (PIS)

Participant ID Code…………

Date……..

1. Study title

A cross cultural comparison of parental perception of their child's fundamental movement skill level, physical activity and weight status between English and Iranian parents.

2. Invitation paragraph

Dear Parents/Guardian

My name is Fatemeh Fazeli, I am currently completing some research which will contribute to my PhD in Sport and Psychology. I would like to invite you to take part in a research study. Before you decide whether you would like to take part it is important for you to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you wish to take part.

3. What is the purpose of the study?

Previous research has reported that fundamental movement skills are very important in influencing a healthy weight status and physical activity level. Therefore the information from this research may be useful for future interventions to help make children more active and maintain a healthy lifestyle.

4. Why have I been chosen?

In this research we are interested to examine physical activity of children 8-10 years old. Therefore we would like to work with children in year 4 and 5 .As your child's school agreed to take part in this research we are asking you if you would like your child and yourself to participate in this research.

5. Do I have to take part?

It is up to you to decide whether or not to take part. There is no obligation that your child must participate and they will be at no disadvantage if they do not wish to take part . If you do decide to take part you need to keep this information sheet and we ask you to sign the consent form. No information will be collected from any children until we have received a signed consent form .If you decide to take part you are still free to withdraw at any time and without giving a reason.

6. What will I have to do?

Your involvement will be very minimal and will require you to fill out some questionnaires which will give us information on how you estimate your child's weight status, their ability to perform physical skills and how physically activit they are. Children will bring questionnaire home and after you fill them ask your children to retune them to their teacher. Filling questionnaires will take approximately 15 minutes. As for your child's partcipation in this project, it will involve them performing some sport skills in front of a camera in their PE lesson, this will include, running, hopping, galloping, skipping, throwing, catching, bouncing, jumping, kicking and balancing. Each session will last as long as the children's PE lessons, this is usually between 45minute to an hour.The videos will be used to assess the children's levels of the skills and **will then be destroyed**. The children will have their height and weight measured in the same PE lesson.Children will also be given an **accelerometer** to wear for a week. This is just like a watch and it will give us information on how active they are during the week.These accelerometers are waterproof and can be worn for aquatic activities as well.After one week researcher will collect the accelerometers from school. In class time the children will complete some questionnaires which will be the very similar to the ones that we have sent to you, to give us an idea of what the children think of themselves. This will take about 10 minutes of children time.

To ensure total confidentiality, all children will be given a number and all data is anonymous and confidential. All information will be kept anonymous.

Please note that in order to ensure quality assurance and equity this project may be selected for audit by a designated member of the committee. This means that the designated member can request to see signed consent forms. However, if this is the case your signed consent form will only be accessed by the designated auditor or member of the audit team.

7. Will I have to provide any bodily samples (i.e. blood/saliva/urine)?

No

8. What are the possible disadvantages and risks of taking part?

There is no known risk in participating in this project.

Appropriate risk assessments for all procedures have been conducted, and will be followed throughout the duration of the study.

9. What are the possible benefits of taking part?

There will be no immediate and direct benefit to your child or to you. We hope that participating in the study will help you. However, this cannot be guaranteed. The information we get from this study may help us to find out more about improving health of children .

10. Will my taking part in the study be kept confidential?

To ensure total confidentiality, all children will be given a number and all data is anonymous and confidential. All participants will be provided with a participant ID number which will be used to identify any data. Participant names or personal details will not be associated with their data, for example the signed consent form will be kept separate from the data. All paper records will be stored in a locked filing cabinet and all electronic data will be stored on a password protected computer. All information you provide will be treated in accordance with the UK Data Protection Act.

11. What will happen to the results of the research study?

The results of the research study will be used as part of an doctorate theses. The results may also be presented at conferences or in journal articles. However, the data will only be used by members of the research team and at no point will your personal information or data be revealed. All information you provide will be treated in accordance with the UK Data Protection Act.

12. Who has reviewed the study?

The study has received full ethical clearance from the Research ethics committee who reviewed the study. The committee is The London Sport Institute REC sub-Committee.

13. Contact for further information

If you have any questions or would like to discuss any issues further please do not hesitate to contact me or my supervisor (details provided below).

Fatemeh Fazeli Email: F.Fazeli@mdx.ac.uk
Tel: (uk)07423633567 / (Iran)09131171501

Dr Lizi Bryant Email:L.Bryant@mdx.ac.uk Tel:0781418616

Middlesex University Hendon campus

The Burroughs

London

NW4 4BT

I would be extremely grateful if you and your child are able to participate in this study. If you have decided to participate please keep the information sheet for future and fill out and return one copy of the informed consent forms to your child's teacher . Thank you in advance for your cooperation.

Thank you for your time

Yours faithfully,

Fatemeh Fazeli

Translation of participant information sheet

تاریخ

عنوان تحقیق
مقایسه فرهنگی از ادراک والدین از سطح مهارت های حرکتی بنیادی کودک، فعالیت بدنی و وضعیت وزن کودک بین انگلیس و ایران

دعوتنامه

ولی/ قیم عزیز
نام من فاطمه فاضلی است، من در حال تکمیل یک پژوهش که به دکترای من در ورزش و روانشناسی کمک خواهد کرد هستم. من می خواهم شما را دعوت به شرکت در یک مطالعه تحقیقاتی کنم. قبل از اینکه شما تصمیم بگیرید که آیا در این تحقیق شرکت کنید برای شما مهم است بدانید چرا تحقیقات در حال انجام است و از شما چه میخواهد . لطفا اطلاعات زیر را به دقت مطالعه نمایید و اگر می خواهید در مورد آن با دیگران بحث کنید. اگر چیزی وجود دارد که مشخص نیست و یا اگر شما اطلاعات بیشتری نیاز دارید از ما بخواهید. نگاهی هم به تصمیم گیری یا نه می خواهید به بخشی.

1. هدف از مطالعه چیست؟
تحقیقات قبلی گزارش داده است که مهارت های حرکتی اساسی وضعیت وزن سالم و سطح فعالیت بدنی بسیار مهم است. بنابراین اطلاعات از این تحقیق ممکن است مفید باشد برای مداخلات آینده برای کمک به فعال تر کردن کودکان و حفظ یک زندگی سالم.

2. چرا من انتخاب شده ام؟
در این تحقیق ما علاقه مند به بررسی فعالیت فیزیکی کودکان 8-10سال هستیم. مدرسه فرزندتان برای شرکت در این تحقیق اماده است و از شما درخواست داریم اگر شما و فرزند شما تمایل به شرکت در این تحقیق دارید.

3. آیا من مجبور به مشارکت هستم؟
تصمیم گیری برای مشارکت به شما بستکی دارد. هیچ الزامی نیست که فرزند شما باید شرکت کنند و هیچ ضرری در مشارکت نکردن متوجه آنها نیست.. اگر شما تصمیم به مشارکت گرفتید شما نیاز به نگه داشتن این برگه اطلاعاتی دارید و ما از شما درخواست داریم که فرم رضایت نامه را امضا کنید. تا زمانی که ما فرم رضایتنامه های امضا شده را دریافت نکرده ایم هیچ اطلاعاتی از کودکان جمع آوری نمی‌گردد و همچنین شما آزاد هستید خودتان و یا فرزند خود را از پروژه در هر زمان خارج کنید.

4. در صورت مشارکت چه باید کرد؟
دخالت شما بسیار کم خواهد بود و شما نیاز به پر کردن پرسشنامه دارید که به ما اطلاعاتی در مورد نحوه وضعیت وزن فرزند خود تان، توانایی آنها برای انجام مهارت های فیزیکی و

میزان فعالیت بدنی آنها میدهد . همانطورکه مشارکت فرزند شما در این پروژه به این صورت خواهد بود که باید برخی از مهارت های حرکتی ورزشی را در مقابل یک دوربین در حال ضبط در زنگ ورزش انجام دهند. این حرکات شامل، دویدن، لی لی، جهش کردن، پرش، پرتاب، سرخوردن، ضربه زدن به توپ، پریدن، و بالانس میباشد. این فیلم ها برای ارزیابی سطح مهارت کودکان استفاده می شود و پس از آن پاک خواهد شد.
قد و وزن کودکان در همان روز اندازه گیری خواهد شد و همچنین به کودکان ساعتهای مخصوصی برای یک هفته داده می شود که مانند یک ساعت مچی معمولی به دستشان میبندند و به ما اطلاعاتی در مورد میزان فعالیت آنها در طول هفته را می دهند. در زمان کلاس کودکان پرسشنامه هایی را که شبیه به پرسشنامهای که ما برای شما ارسال کردیم کامل میکنندکه به ما در باره نگرششان درباره خودشان کمک میکند.
برای اطمینان از محرمانه بودن اطلاعات کودکان، به همه آنها یک کد مخصوص داده خواهد شد و تمام داده ها ناشناس و محرمانه خواهد ماند.

لطفا توجه داشته باشید که به منظور حصول اطمینان تضمین کیفیت و حقوق صاحبان سهام این پروژه ممکن است برای حسابرسی توسط یکی از اعضای تعیین شده کمیته انتخاب شده است. این به این معنی که عضو تعیین شده می توانید درخواست برای دیدن فرم های رضایت را امضا کردند. با این حال اگر این مورد است فرم رضایت امضا شده خود را تنها با حسابرس تعیین شده و یا عضو تیم ممیزی قابل دسترسی است.

5. آیا سمپل بدنی مثل خون وادرار باید بدهم؟

خیر

6. معایب احتمالی و خطرات چیست؟

هیچ خطر شناخته شده در مشارکت در این پروژه وجود دارد.

7. فواید احتمالی مشارکت چیست؟

در مشارکت در این پروژه سود فوری و مستقیم برای شما و یا کودک شما وجود ندارد. اما مشارکت فرزند شما به احتمال زیاد به ما کمک می کند در پیدا کردن اطلاعات بیشتر در مورد بهبود سلامت کودکان.

8. مشارکت من در مطالعه محرمانه نگه داشته می‌شود؟

برای اطمینان از محرمانه بودن، به همه کودکان یک عدد داده خواهد شد و تمام داده ها ناشناس و محرمانه است. به همه شرکت کنندگان یک شماره شناسایی داده خواهد شد که برای شناسایی استفاده می شود هر گونه اطلاعات ارائه شده با نام شرکت کنندگان و یا اطلاعات شخصی ا در ارتباط نیست، به عنوان مثال فرم رضایت امضا جدا از داده ها نگهداری می شود. تمام سوابق مقاله در کابینه تشکیل پرونده قفل شده ذخیره می شود و تمام داده های الکترونیکی بر روی یک کامپیوتر با رمز محافظت شده ذخیره می شود.

9. نتایج حاصل از مطالعه تحقیقاتی چه خواهد شد ؟

در پایان مطالعه، داده ها برای تکمیل یک پایان نامه دکترا تجزیه و تحلیل خواهد شد. یافته های پژوهش به طور گسترده تر، اشتراک گذاشته خواهد شد برای مثال، از طریق نشریات و کنفرانس ها. همه داده ها ناشناس و محرمانه است، اطلاعات محرمانه باقی خواهد ماند بنابراین

نام شما در گزارش / انتشار مشخص نمی شوند. شما می توانید برای نتایج با محقق تماس بگیرید.

10. چه کسی مطالعه را بررسی کرده است؟

پژوهش حاضر با پژوهش کمیته اخلاق دانشگاه میدلسکس لندن دانشکده ورزشی موسسه REC بررسی شده.

تماس برای کسب اطلاعات بیشتر

اگر شما هر گونه سوال و یا نیاز به اطلاعات بیشترداريد لطفا از تماس با من و یا استاد راهنمای من دریغ نکنید. (جزئیات در زیر ارائه شده است) با کمال تشکر

فاطمه فاضلی ایمیل: F.Fazeli@mdx.ac.uk تلفن: (UK) 07423633567 / (ایران) 09131171501

دکتر Lizi Bryant ایمیل: تلفن L.Bryant@mdx.ac.uk: 07814186168

دانشگاه میدلسکس Middlesex

لندن

NW4 4BT

من منتظر مشارکت شما و فرزندتان در این پروژه تحقیقی دانشگاهی می باشم.. اگر شما تصمیم به شرکت گرفتید لطفا به برگه اطلاعاتی را برای خود نگه دارید و یک کپی از فرم رضایت نامه را به معلم فرزند تان باز گردانید. و پیشاش پیش از همکاری شما تشکر میکنم.

ممنون بخاطر وقتی که گذاشتید

ارادتمند شما،

فاطمه فاضلی

fm

Cover letter /Debriefing

Dear Parent/Guardian,

My name is Fatemeh Fazeli, I am currently completing some research which will contribute to my PhD in Sport and Psychology. Previous research has reported that fundamental movement skills are very important in influencing a healthy weight status and physical activity level. Therefore the information from this research may be useful for future interventions to help make children more active and maintain a healthy lifestyle.

I am therefore writing to you to ask whether you and your children would be willing to participate in this study.

Your involvement will be very minimal and will require you to fill out the attached questionnaires which will give us information on how you estimate your child's weight status, their ability to perform physical skills and how physically activit they are. All information will be kept anonymous.

As for your child's partcipation in this project, it will involve them performing some sport skills in front of a camera in their PE lesson, this will include, running, hopping, galloping, skipping, throwing, catching, bouncing, jumping, kicking and balancing. The videos will be used to assess the children's levels of the skills and **will then be destroyed**. The children will have their height and weight measured in the same PE lesson.

Children will also be given an **accelerometer** to wear for a week. This is just a watch and it will give us information on how active they are during the week. In class time the children will complete some questionnaires which will be the very similar to the ones that we have sent to you, to give us an idea of what the children think of themselves.

To ensure total confidentiality, all children will be given a number and all data is anonymous and confidential.

Can I also reassure you that all adults involved in this research have been through DBS Checks set out by the university.

No information will be collected from any children until we have received a signed consent form. You are free to withdraw yourself and/or your child from the project at any time point.

There is no obligation that your child must participate and they will be at no disadvantage if they do not wish to take part.

I would be extremely grateful if you and your child are able to participate in my study. Please fill out and return the informed consent forms and the questionnaires to your child's teacher by Friday 26TH February 2016.

If you have any questions or would like to discuss any issues further please do not hesitate to contact me or my supervisor (details provided below).

Fatemeh FazeliEmail: AAAAAAAAAAA Tel: AAAAAA

Dr Lizi BryantEmail: AAAAAAAAAAA Tel: AAAAAA

I would like to thank the Head teacher, physical education teacher, and classroom teachers of Christ Church CE Primary School for their support of this educational project.

I am looking forward to your child's participation in this university research project, and thank you in advance for your cooperation.

Thank you for your time

Yours faithfully,

Fatemeh Fazeli

Translation of cover letter/Debriefing

ولی / قیم محترم،

اینجانب فاطمه فاضلی ، در حال حاضر مشغول تکمیل پژوهشی هستم که به دکترای من در رشته روانشناسی ورزشی کمک خواهد کرد. درتحقیقات قبلی به دست آمده است که مهارت های حرکتهای بنیادین دروضعیت وزن سالم و سطح فعالیت بدنی موثرهستند. بنابراین, اطلاعات حاصله از این تحقیق برای کمک به فعال تر کردن کودکان و حفظ یک زندگی سالم مفید خواهد بود.

بنا براین آیا شما و فرزند تان مایل به شرکت در این مطالعه میباشید. مشارکت شما بسیارکم خواهد بود و شما نیاز به پرکردن پرسشنامه ای که همراه این برگه میباشد دارید، که اطلاعاتی در مورد وضعیت وزن فرزندتان، توانایی فرزندتان برای انجام مهارت های فیزیکی و میزان فعالیتهای بدنی آنها را به ما میدهد.

تمام اطلاعات محرمانه نگه داشته خواهد شد .

همانطورکه مشارکت فرزند شما در این پروژه به این صورت خواهد بود که باید برخی از مهارت های حرکتی ورزشی را در مقابل یک دوربین در حال ضبط در زنگ ورزش انجام دهند. این حرکات شامل، دویدن، لی لی، جهش کردن، پرش، پرتاب، سرخوردن، ضربه زدن به توپ، پریدن، و بالانس میباشد. این فیلم ها برای ارزیابی سطح مهارت کودکان استفاده می شود و پس از آن پاک خواهد شد.

قد و وزن کودکان در همان روز اندازه گیری خواهد شد و همچنین به کودکان ساعتهای مخصوصی برای یک هفته داده می شود که مانند یک ساعت مچی معمولی به دستشان میبندند و به ما اطلاعاتی در مورد میزان فعالیت آنها در طول هفته را می دهند. در زمان کلاس کودکان پرسشنامه هایی را که شبیه به پرسشنامهای که ما برای شما ارسال کردیم کامل میکنندکه به ما در باره نگرششان درباره خودشان کمک میکند.

برای اطمینان از محرمانه بودن اطلاعات کودکان، به همه آنها یک کد مخصوص داده خواهد شد و تمام داده ها ناشناس و محرمانه خواهد ماند.

من همچنین به شما اطمینان میدهم که همه بزرگسالان که در این پژوهش همکاری میکنند توسط دانشگاه تایید شده و دارای صلاحیت لازم میباشند.

تا زمانی که ما فرم رضایتنامهای امضا شده را دریافت نکرده ایم هیچ اطلاعاتی از کودکان جمع آوری نمیگردد و همچنین شما آزاد هستید خودتان و یا فرزند خود را از پروژه در هر زمان خارج کنید.

هیچ الزامی نیست که فرزند شما باید در این پژوهش شرکت کند و در صورت عدم تمایل به مشارکت هیچ گونه ایراد و تاثیر منفی برای او وجود ندارد.

من بسیار قدر دانی میکنم اگر شما و کودکتان برای کمک به این پژوهش همکاری کنید. لطفا با پر کردن و بازگرداندن فرم رضایتنامه به معلم فرزندتان در این پژوهش شرکت کنید.

اگر شما هر گونه سوال و یا نیاز به اطلاعات بیشترداريد لطفا از تماس با من و یا استاد راهنمای من دریغ نکنید. (جزئیات در زیر ارائه شده است)

من منتظر مشارکت شما و فرزندتان در این پروژه تحقیقی دانشگاهی می باشم و پیشاش پیش از همکاری شما کمال تشکر را دارم.

فاطمه فاضلی

ایمیل F.Fazeli@mdx.ac.uk :تلفن: 09133133227

دکتر Lizi Bryant ایمیل: تلفن07814186168 :L.Bryant@mdx.ac.uk

با تشکر از مدیر، ناظم و معلم تربیت بدنی، و معلمان در کلاس درس دبستان XXXXXXXXXX برای حمایت خود در این پروژه آموزشی.

Parental Informed CONSENT FORM

Research Title: A cross cultural comparison of parental perception of their child's fundamental movement skill level, physical activity and weight status between English and Iranian parents.

Researcher: Fatemeh Fazeli

Consent

1. I confirm that I have read and understand the information sheet dated ....………………..…for the above study and have had the opportunity to ask questions.

2. I understand that my child’s participation is voluntary and that I am free to withdraw them at any time, without giving any reason.

3. I agree that this form that bears my name and signature may be seen by a designated auditor.

4. I agree that my child’s non-identifiable research data may be stored in National Archives and be used anonymously by others for future research. I am assured that the confidentiality of my data will be upheld through the removal of any personal identified.

5. I agree to give consent for my child to take part in the above study.

______________________________ ________________ _____________________________

Name of child Year Group Class

Name of parent/guardian Date Signature

Researcher Date Signature

Translation of consent form

عنوان تحقیق: مقایسه فرهنگی از ادراک والدین از سطح مهارت حرکتی بنیادی کودک، فعالیت بدنی و وضعیت وزن کودک بین انگلیس و ایران

محقق: فاطمه فاضلی

فرم رضایت نامه والدین

1. من تایید می‌کنم که کلیه مطالب فرم همکاری پژوهشی شما را خوانده و درک کرده ام و همچنین در صورت داشتن هرگونه سوال در رابطه با آن به طور آگاهانه پرسش کنم.
2. من مطلع هستم که مشارکت من و فرزندم داوطلبانه و اختیاری و میتوانیم در هر زمان از این پژوهش کناره گیری کنیم بدون دادن هر دلیل.
3. من قبول دارم که این فرم که نام و امضای من در پای آن است ممکن است توسط یک شخص تعیین شده دیده می شود.
4. من موافقم که داده های غیر قابل شناسایی من و فرزند من در این تحقیق در آرشیو ملی ذخیره و به صورت ناشناس توسط دیگران برای تحقیقات آینده استفاده شود. من مطمئن هستم که کلیه اطلاعات به صورت محرمانه بایگانی میگردد.
5. .من موافق به شرکت در مطالعه فوق میباشم و رضایت به مشارکت فرزندم میدهم.

نام کودک ------------------- مقطع تحصیلی -----------------

نام ولی/سرپرست ----------------- تاریخ ------------ امضا -------------

محقق ----------------- تاریخ ------------ امضا -------------

Appendix C: Questionnaires

Demographic questionnaire

Parent survey

Dear parent/Guardian

We need your help to make our study a success. Your honest answers to the items in this survey are very valuable. Please take a few minutes to complete this survey, then have your child return it to his or her teacher. This will not take too long to complete.

Remember: We want to know what you think , There are no right or wrong answers,
Everything you tell us will be kept strictly confidential (secret). Please Try to answer all the questions , however if there is any question that you do not want to answer go to the next question.

Demographic questionnaire

Please tell us about yourself

Your Age: --------

Your Gender: 0. Male 1. Female

Your Ethnicity:
1.White
2.Mixed / Multiple ethnic groups
3.Asian / Asian British
4.Black / African / Caribbean / Black British
5.Other ethnic group

Your Education:
1.School Education
2.College Education
3.University Education

Your Marital Status:
1.Married/Living as married
2.Single/Engaged

3.Widowed
4.Separated
5.Divorced

Your height: _____ feet ____ inches

Your weight: ________ pounds

Your relation to the child:
1.Father
2.Mother
3.Guardian

Your home postcode   ------------

Please tell us about your child

Child's Name: ---------------------

What is your child's grade: 4   or   5

What is your child's gender?   0. Male   1. Female

How do you identify your child's racial or ethnic background? (circle one number)

1.White
2.Mixed / Multiple ethnic groups
3.Asian / Asian British
4.Black / African / Caribbean / Black British
5.Other ethnic group

How you describe your child weight status:

1. Very underweight
2. Underweight
3. About the right weight
4. Overweight
5. Very overweight

Translation of Demographic questionnaire for parents

نظرسنجی پدر و مادر

ولی / قیم محترم

ما برای موفقیت در تحقیقمان به کمک شما نیاز داریم. پاسخ صادقانه شما به موارد موجود در این نظرسنجی بسیار با ارزش است. لطفا چند دقیقه برای تکمیل این نظرسنجی وقت بگذارید، سپس از کودک خود بخواهید آن را به معلم خود بازگرداند. تکمیل این نظرسنجی وقت زیادی نمی‌خواهد.

به یاد داشته باشید: ما می‌خواهیم بدانیم چه فکر می‌کنید، هیچ پاسخ درست یا غلط وجود ندارد.

چیزهای که شما به ما می‌گویید به طور محرمانه (مخفی) نگهداری خواهد شد. لطفا سعی کنید به تمام سوالات پاسخ دهید، با این حال اگر سوالی هست که شما نمی‌خواهید پاسخ دهید به سوال بعدی بروید.

پرسشنامه مشخصات فردی {لطفا در مورد خودتان (والدین) به ما بگویید}

سن	جنسیت	قد سانتیمتر	وزن کیلوگرم

تحصیلات شما		وضعیت تاهل شما		رابطه با کودک	
1.زیر دیپلم/دیپلم		1.متاهل		1.پدر	
2.فوق دیپلم / لیسانس		2.جدا شده		2.مادر	
3.فوق لیسانس / بالاتر		3. غیره		3.غیره	

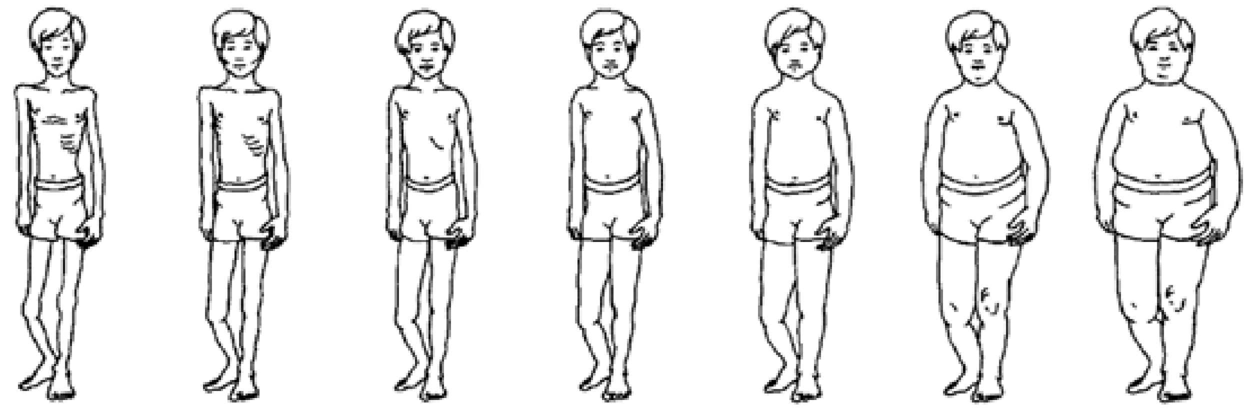
لطفا در مورد کودک خود به ما بگویید

نام دانش آموز	جنسیت دانش آموز	مقطع تحصیلی

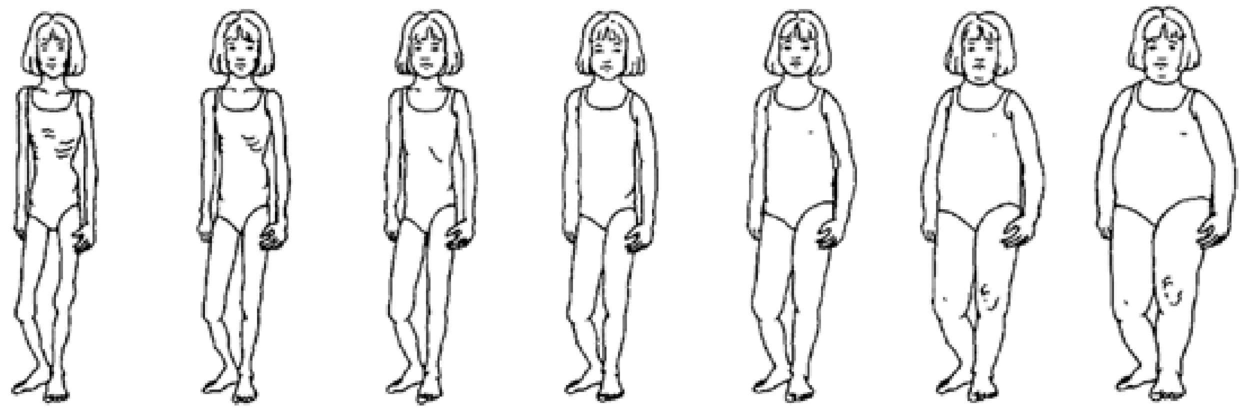
وضعیت وزن کودک خود را چگونه توصیف می کنید:	
1.بسیار کم وزن است	
2.کم وزنی دارد	
3.دارای وزن مناسب است	
4.اضافه وزن دارد	
5.زیاد اضافه وزن دارد	

Parent's perception of weight status

Direction: Based on your child gender, Please select the one, which you believe is most similar to your child actual figure.



1 2 3 4 5 6 7

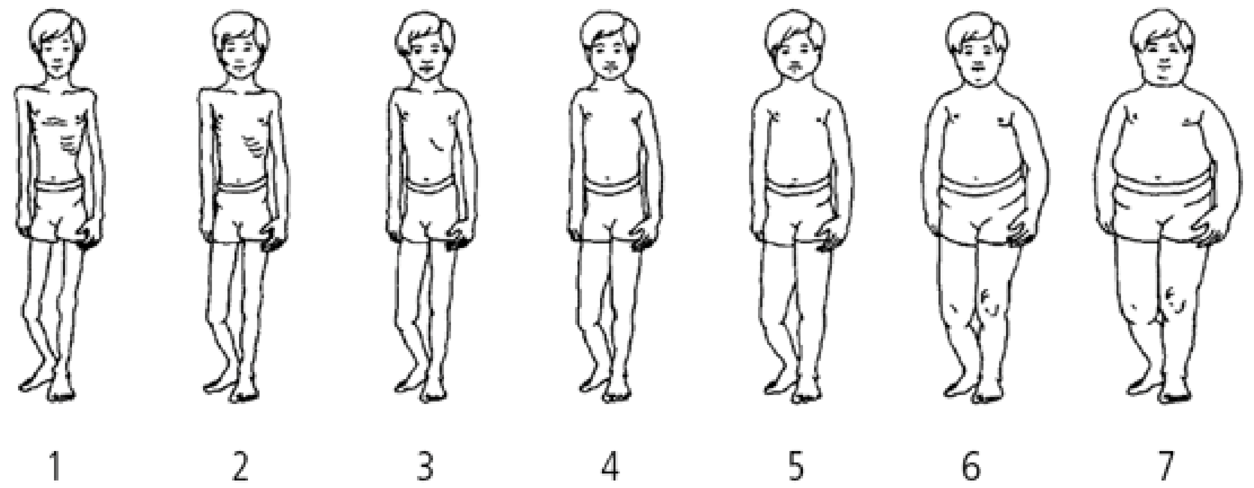


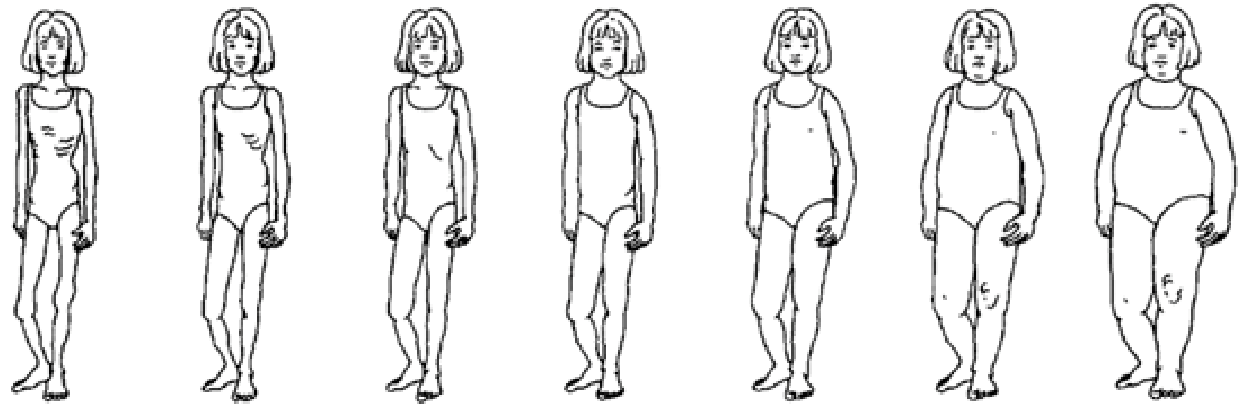
1 2 3 4 5 6 7

Translation of Parents perception of their child’s weight

ادراک والدین از حالت بدن بچه

دستورالعمل: بر اساس جنسیت فرزندتان، لطفاً تصویری را که فکر می‌کنید بیشتر به او شبیه است انتخاب کنید





1 2 3 4 5 6 7

Children's Leisure Activities Study (CLASS)

Children's Leisure Activities Study Survey

Parent Questionnaire

PLEASE NOTE: THIS QUESTIONNAIRE WILL TAKE APPROXIMATELY 10 MINUTES TO COMPLETE

Your child's name: ______________________________

Your child's teacher: ______________________________

The following questions relate to the child you have named on the front cover of the questionnaire.

Which of the following PHYSICAL activities does your child USUALLY do during a typical <u>WEEK</u>? (from the start of the current school term, do NOT include school holidays)

During a typical WEEK what activities does your CHILD **usually** do?	Does your child usually do this activity?	MONDAY - FRIDAY		SATURDAY - SUNDAY	
		How many times **Monday-Friday**?	**Total** hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	**Total** hours/minutes **Saturday & Sunday**
Example :Bike riding	**No Yes**	2	40mins	1	15mins
Aerobics	No Yes				
Dance	No Yes				
Calisthenics/gymnastics	No Yes				
Tennis/ bat tennis	No Yes				
Aussie Rules Football	No Yes				
Soccer	No Yes				
Basketball	No Yes				

During a typical WEEK what activities does your child **usually** do?	Does your child usually do this activity?	MONDAY - FRIDAY		SATURDAY - SUNDAY	
		How many times **Monday-Friday?**	**Total** hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	**Total** hours/minutes **Saturday & Sunday**
Cricket	No Yes				
Netball	No Yes				
Baseball/softball	No Yes				
Swimming laps	No Yes				
Swimming for fun	No Yes				
Down ball/4 square	No Yes				
Tag/chasey	No Yes				
Skipping rope	No Yes				
Roller blading	No Yes				
Scooter	No Yes				
Skateboarding	No Yes				
Bike riding	No Yes				
Household chores	No Yes				

During a typical WEEK what activities does your child **usually** do?	Does your child usually do this activity?	MONDAY - FRIDAY		SATURDAY - SUNDAY	
		How many times **Monday-Friday?**	**Total** hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	**Total** hours/minutes **Saturday & Sunday**
Play on playground equipment	No Yes				
Play in the cubby house	No Yes				
Bounce on the trampoline	No Yes				
Play with pets	No Yes				
Walk the dog	No Yes				
Walk for exercise	No Yes				
Jogging or running	No Yes				
Physical education class	No Yes				
Sport class at school	No Yes				
Travel by walking to school (to and from school = times)	No Yes				
Travel by cycling to school (to and from school = times)	No Yes				
Other (please state)	No Yes				

During a typical WEEK what other leisure activities does your child **usually** do?	Does your Child usually do this activity?	**Total** hours/minutes **Monday-Friday**	**Total** hours/minutes **Saturday & Sunday**
E.G. TV/videos	**No** **Yes**	**15hrs**	**6hrs 30mins**
TV / videos	No Yes		
Playstation / Nintendo / computer games	No Yes		
Computer / Internet	No Yes		
Homework	No Yes		
Play indoors with toys	No Yes		
Sitting talking	No Yes		
Talk on the phone	No Yes		
Listen to music	No Yes		
Musical instrument	No Yes		
Board games/cards	No Yes		
Reading	No Yes		
Art & craft (eg. pottery, sewing, drawing)	No Yes		
Imaginary play	No Yes		
Travel by car / bus (to and from school)	No Yes		
Other (please state) ____________________	No Yes		

Translation of CLASS question for parents

پرسشنامه والدین از میزان فعالیت بدنی کودکان

پدر و مادر عزیز سپاس از همراهی تون....

کدامیک از فعالیتهای بدنی زیر را کودک شما به طور عادی در طول یک هفته انجام می دهد؟(در سال تحصیلی و نه در تعطیلات تابستان)

کدامیک از فعالیتهای بدنی زیر را کودک شما به طور عادی در طول یک هفته انجام می دهد	انجام نمیدهد	انجام میدهد	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
دوچرخه سواری	خیر	بله				
ایروبیک	خیر	بله				
رقص	خیر	بله				
ژیمناستیک یا ورزشهای سبک بدون وسیله	خیر	بله				
تنیس روی میز /تنیس خاکی	خیر	بله				
فوتبال آمریکایی	خیر	بله				
فوتبال	خیر	بله				
بسکتبال	خیر	بله				
کریکت	خیر	بله				
نت بال	خیر	بله				
بیسبال/سافتبال	خیر	بله				
کلاس شنا	خیر	بله				
شنای تفریحی	خیر	بله				

کدامیک از فعالیتهای بدنی زیر را کودک شما به طور عادی در طول یک هفته انجام می دهد	انجام نمیدهد	انجام میدهد	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
Down ballخانه بازی	خیر	بله				
شطرنج	خیر	بله				
طناب زدن	خیر	بله				
غلت زدن	خیر	بله				
اسکوتر	خیر	بله				
اسکیت	خیر	بله				
موتورسواری	خیر	بله				
کار در خانه	خیر	بله				
بازی با تجهزات در زمین بازی	خیر	بله				
بازی در خانه	خیر	بله				
پرش ترامپولین	خیر	بله				
بازی با حیوانات خانگی	خیر	بله				
راه رفتن با سگ	خیر	بله				
راه رفتن برای تمرین	خیر	بله				
سریع راه رفتن یا دودیدن	خیر	بله				
کلاسهای تربیت بدنی	خیر	بله				
کلاسهای ورزش مدرسه	خیر	بله				
پیاده به مدرسه رفتن و برگشتن	خیر	بله				
با دوچرخه به مدرسه رفتن و برگشتن	خیر	بله				

کدامیک از فعالیتهای بدنی زیر را کودک شما به طور عادی در طول یک هفته انجام می دهد	انجام نمیدهد	انجام میدهد	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
Other (please state)	خیر	بله				
تماشای تلویزیون	خیر	بله				
بازیهای کامپیوتری،پلی استین	خیر	بله				
کار با کامپیوتر و اینترنت	خیر	بله				
تکلیف منزل	خیر	بله				
صحبت کردن با تلفن	خیر	بله				
بازی با اسباب بازی	خیر	بله				
نشستن و حرف زدن	خیر	بله				
گوش دادن به موسیقی	خیر	بله				
نواختن موسیقی	خیر	بله				
بازیهای فکری / کارتی	خیر	بله				
خواندن	خیر	بله				
هنر و مهارت(سفالگری، دوزندگی و رسم	خیر	بله				
بازیهای تخیلی	خیر	بله				
رفتن به مدرسه و برگشتن با ماشین و اتوبوس	خیر	بله				
Other state	خیر	بله				

Parental perception of child athletic competence

Child's Name__________________________ Child's Grade_____

DIRECTION: Please indicate what you feel to be your child actual competence on each question, in your opinion. First decide what kind of child he or she is like—the one described on the left or right—then indicate whether this is just sort of true or really true for that individual. Thus, for each item, check one of four boxes

	Really True For me	Sort of True For me				Sort of True For me	Really True For me
1.	☐	☐	My child does really well at all kinds of sports	OR	My child isn't very good when it comes to sports	☐	☐
2.	☐	☐	My child is better than others his/her age at sports	OR	My child can not play as well.	☐	☐
3.	☐	☐	My child does not do well at new outdoor games	OR	My child is good at new games right away	☐	☐
4.	☐	☐	My child does well at games that involve kicking balls	OR	My child does not do well at games that involve kicking balls	☐	☐
5.	☐	☐	My child does well at games that involve catching balls	OR	My child does not do well at games that involve catching balls	☐	☐
6.	☐	☐	My child is not good at running fast	OR	My child is good at running fast.	☐	☐
7.	☐	☐	My child does well at games that involve overhand throwing	OR	My child does not do well at games that involve overhand throwing	☐	☐
8.	☐	☐	My child does well at games that involve underhand throwing	OR	My child does not do well at games that involve underhand throwing	☐	☐
9.	☐	☐	My child is not able to jump far	OR	My child is able to jump far	☐	☐
10.	☐	☐	My child is good at dribbling or bouncing balls	OR	My child is not good at dribbling or bouncing balls	☐	☐

11.	☐	☐	My child does well at games that involve striking (hitting) a ball	OR	My child does not do well at games that involve striking (hitting) a ball	☐	☐
12.	☐	☐	My child is not able to gallop well	OR	My child is able to gallop well	☐	☐
13.	☐	☐	My child can leap far	OR	My child can not leap far	☐	☐
14.	☐	☐	My child is able to hop well	OR	My child is not able to hop well	☐	☐
15.	☐	☐	My child is not good at side gallop	OR	My child can side gallop well	☐	☐

Translation of Parental perception of child athletic competence

نام فرزندتان **کلاس:**

پرسشنامه زیر برای تعیین درک شما در مورد توانایی فرزندتان در ورزش، لذت بردن از فعالیتهای بدنی، و در طول کلاس های تربیت بدنی و ورزش است.
ابتدا هر سوال را به دقت خوانده یکی از گزینه ها را انتخاب کرده،سپس گزینه مورد نظر (الف یا ب) را انتخاب نماییدو سپس یکی از☐ تاحدودی درست است و یا کاملا درست است راعلامت بزنید.

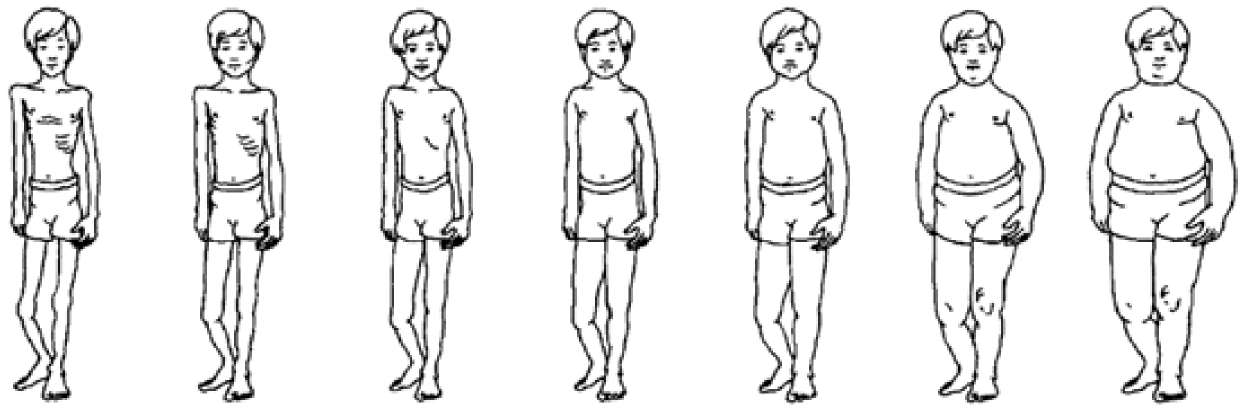
	کاملا درست	تاحدودی درست	گزینه الف		گزینه ب	تاحدودی درست	کاملا درست
1	☐	☐	فرزند من در همه ورزشها عملکردخیلی خوبی دارد	اما	فرزند من در ورزش عملکرد خوبی ندارد	☐	☐
2	☐	☐	فرزند من در فعالیت های ورزشی خیلی بهتر از همسالان خود است	اما	فرزند من نمی تواند به خوبی بازی کند	☐	☐
3	☐	☐	فرزند من در بازیهای جدیدی که در فضای باز انجام میشود عملکرد خوبی ندارد	اما	فرزند من در بازیهای جدید عملکرد خوبی دارد	☐	☐
4	☐	☐	فرزند من عملکرد خوبی در ورزشهایی که نیاز به شوت کردن توپ با پا باشد دارد	اما	فرزند من در ورزشهایی که نیاز به شوت کردن توپ با پا هست خوب عمل نمی کند	☐	☐
5	☐	☐	فرزند من عملکرد خوبی در ورزشهایی که شامل دریافت توپ با دست هست دارد	اما	فرزند من در ورزشهایی که نیاز به دریافت توپ با دست هست خوب عمل نمی کند	☐	☐
6	☐	☐	فرزند من در دویدن سریع خوب نیست	اما	فرزند من خیلی خوب سریع می دود	☐	☐
7	☐	☐	فرزند من در ورزشهایی که نیاز به پرتاب از پایین به بالا است عملکرد خوبی دارد	اما	فرزند من در ورزشهایی که نیاز به پرتاب توپ از پایین به بالاست عملکرد خوبی ندارد	☐	☐
8	☐	☐	فرزند من در فعالیتهایی که نیاز به پرتاب پایین تر شانه یا به سمت پایین باشد عملکرد بهتری دارد	اما	فرزند من در ورزشهایی که نیاز به پرتاب از پایین به بالا میباشند عملکرد خوبی دارد	☐	☐
9	☐	☐	فرزند من نمیتوانند خیلی زیاد بپرد	اما	فرزند من میتوانند خیلی زیاد بپرد	☐	☐
10	☐	☐	فرزند من در دریبل کردن توپ عملکرد خوبی دارد	اما	فرزند من در دریبل کردن توپ عملکرد خوبی ندارد	☐	☐

☐	☐	فرزند من در ورزشهایی که نیاز به ضربه زدن به توپ دارد عملکرد خوبی ندارد	اما	فرزند من در ورزشهایی که نیاز به ضربه زدن به توپ دارد عملکرد خوبی دارد	☐	☐	11
☐	☐	فرزند من می تواند به خوبی بتازد وبدود	اما	فرزند من نمی تواند به خوبی بتازد وبدود	☐	☐	12
☐	☐	فرزند من قادرنیست به خوبی جهش کند	اما	فرزند من قادراست به خوبی جهش کند	☐	☐	13
☐	☐	رزند من قادر نیست به خوبی لی لی بزند	اما	فرزند من قادراست به خوبی لی لی بزند	☐	☐	14
☐	☐	فرزند من قادرنیست به خوبی پابوکس به پهلو برود	اما	فرزند من قادراست به خوبی پابوکس به پهلو برود	☐	☐	15

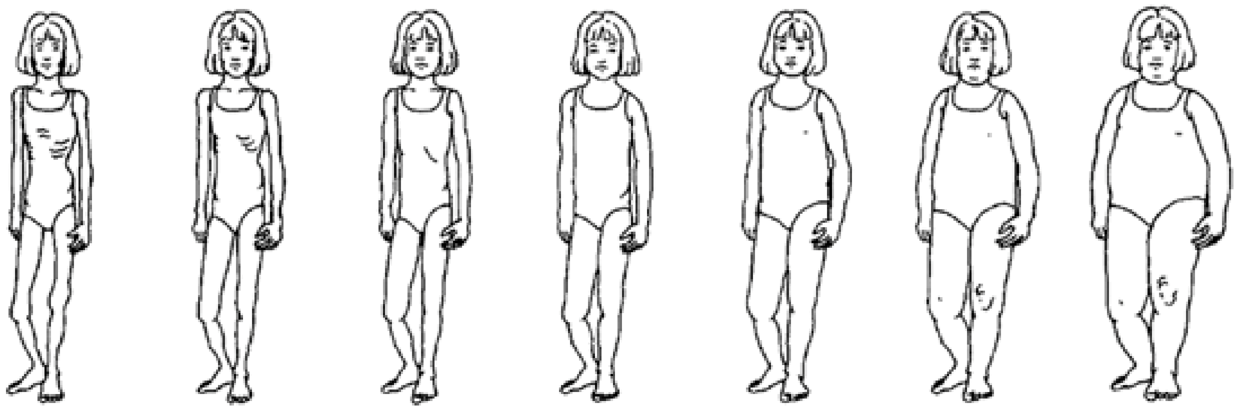
Appendix D : Children's questionnaires

Children's perception of weight status

Direction: Girls or Boys , Please select the one, which you think is most similar to you.



1 2 3 4 5 6 7

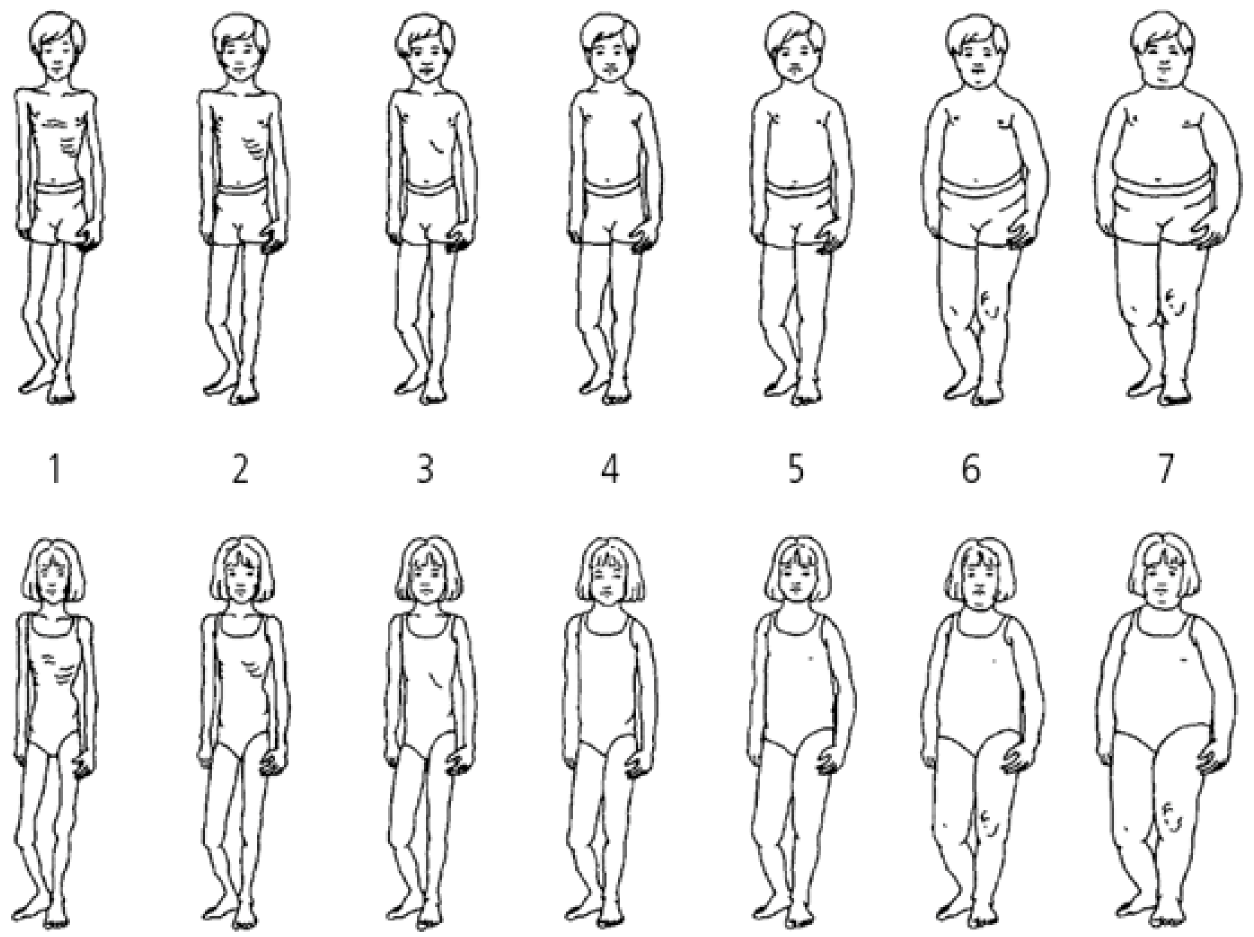


1 2 3 4 5 6 7

Translation of Children’s perception of weight status

ادراک بچه‌ها از حالت بدن

دستورالعمل: دخترها یا پسرها، لطفا تصویری را که فکر می‌کنید بیشتر به شما شبیه است انتخاب کنید.



1 2 3 4 5 6 7

Translation of CLASS question for parents

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Children's
Leisure Activities Study
(CLASS)

Children's Leisure Activities Study Survey

Children's Questionnaire

Important
We are interested in what you do in your leisure time during a typical week.
There are no right and wrong answers- **this is not a test**
Please answer all the questions as honestly and accurately as you can- this is very important.

Which of the following PHYSICAL activities do you USUALLY do during a typical WEEK (from the start of the current school term, do NOT include school holidays)?

During a typical WEEK what activities do you **usually** do?	Do you usually do this activity?	MONDAY - FRIDAY		SATURDAY - SUNDAY	
		How many times **Monday-Friday?**	Total hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	Total hours/minutes **Saturday & Sunday**
E.g. Bike riding	**No$_1$ Yes$_2$**	**2**	**40mins**	**1**	**15mins**
Aerobics	No$_1$ Yes$_2$				
Dance	No$_1$ Yes$_2$				
Calisthenics/gymnastics	No$_1$ Yes$_2$				
Tennis/ bat tennis	No$_1$ Yes$_2$				
Aussie Rules Football	No$_1$ Yes$_2$				
Soccer	No$_1$ Yes$_2$				
Basketball	No$_1$ Yes$_2$				
Cricket	No$_1$ Yes$_2$				
Netball	No$_1$ Yes$_2$				

During a typical WEEK what activities do you **usually** do?	Do you usually do this activity?	**MONDAY - FRIDAY**		**SATURDAY - SUNDAY**	
		How many times **Monday-Friday?**	Total hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	Total hours/minutes **Saturday & Sunday**
Baseball/softball	No1 Yes2				
Swimming laps	No1 Yes2				
Swimming for fun	No1 Yes2				
Down ball/4 square	No1 Yes2				
Tag/chasey	No1 Yes2				
Skipping rope	No1 Yes2				
Roller blading	No1 Yes2				
Scooter					
Skateboarding	No1 Yes2				
Bike riding	No1 Yes2				
Household chores	No1 Yes2				
Play on playground equipment	No1 Yes2				
Play in the cubby house	No1 Yes2				

During a typical WEEK what activities do you **usually** do?	Do you usually do this activity?	**MONDAY - FRIDAY**		**SATURDAY - SUNDAY**	
		How many times **Monday-Friday?**	Total hours/minutes **Monday-Friday**	How many times **Saturday & Sunday?**	Total hours/minutes **Saturday & Sunday**
Bounce on the trampoline	No1 Yes2				
Play with pets	No1 Yes2				
Walk the dog	No1 Yes2				
Walk for exercise	No1 Yes2				
Jogging or running	No1 Yes2				
Physical education class	No1 Yes2				
Sport class at school	No1 Yes2				
Travel by walking to school (to and from school = 2 times)	No1 Yes2				
Travel by cycling to school (to and from school = 2 times)	No1 Yes2				
Other (please state) ________________________	No1 Yes2				

During a typical WEEK what other leisure activities do you **usually** do?	Do you usually do this activity?	Total hours/minutes **Monday-Friday**	Total hours/minutes **Saturday & Sunday**
E.G. TV/videos	**No$_1$ Yes$_2$**	**15hrs**	**6hrs 30mins**
TV / videos	No$_1$ Yes$_2$		
Playstation / Nintendo / computer games	No$_1$ Yes$_2$		
Computer / Internet	No$_1$ Yes$_2$		
Homework	No$_1$ Yes$_2$		
Play indoors with toys	No$_1$ Yes$_2$		
Sitting talking	No$_1$ Yes$_2$		
Talk on the phone	No$_1$ Yes$_2$		
Listen to music	No$_1$ Yes$_2$		
Musical instrument	No$_1$ Yes$_2$		
Board games/cards	No$_1$ Yes$_2$		
Reading	No$_1$ Yes$_2$		
Art & craft (eg. pottery, sewing, drawing)	No$_1$ Yes$_2$		
Imaginary play	No$_1$ Yes$_2$		
Travel by car / bus (to and from school)	No$_1$ Yes$_2$		
Other (please state) ____________________	No$_1$ Yes$_2$		

Translation of CLASS questionnaire for children

پرسشنامه کودکان از میزان فعالیت بدنی کودکان

دانش آموزان عزیز سپاس از همراهی تون....

کدامیک از فعالیتهای بدنی زیر را شما به طور عادی در طول یک هفته انجام می دهید؟(در سال تحصیلی و نه در تعطیلات تابستان)

کدامیک از فعالیتهای بدنی زیر را شما به طور عادی در طول یک هفته انجام می دهید	انجام میدهم	انجام نمیدهم	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
دوچرخه سواری	خیر	بله				
ایروبیک	خیر	بله				
رقص	خیر	بله				
ژیمناستیکیا ورزشهای سبک بدون وسیله	خیر	بله				
تنیس روی میز /تنیس خاکی	خیر	بله				
فوتبال آمریکایی	خیر	بله				
فوتبال	خیر	بله				
بسکتبال	خیر	بله				
کریکت	خیر	بله				
نت بال	خیر	بله				
بیسبال/سافتبال	خیر	بله				
کلاس شنا	خیر	بله				
شنای تفریحی	خیر	بله				

کدامیک از فعالیتهای بدنی زیر را شما به طور عادی در طول یک هفته انجام می دهید	انجام میدهم	انجام نمیدهم	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
Down ballخانه بازی	خیر	بله				
شطرنج	خیر	بله				
طناب زدن	خیر	بله				
غلت زدن	خیر	بله				
اسکوتر	خیر	بله				
اسکیت	خیر	بله				
موتورسواری	خیر	بله				
کار در خانه	خیر	بله				
بازی با تجهزات در زمین بازی	خیر	بله				
بازی در خانه	خیر	بله				
پرش ترامپولین	خیر	بله				
بازی با حیوانات خانگی	خیر	بله				
راه رفتن با سگ	خیر	بله				
راه رفتن برای تمرین	خیر	بله				
سریع راه رفتن یا دودیدن	خیر	بله				
کلاسهای تربیت بدنی	خیر	بله				
کلاسهای ورزش مدرسه	خیر	بله				
پیاده به مدرسه رفتن و برگشتن	خیر	بله				
با دوچرخه به مدرسه رفتن و برگشتن	خیر	بله				

کدامیک از فعالیتهای بدنی زیر را شما به طور عادی در طول یک هفته انجام می دهید	انجام میدهم	انجام نمیدهم	چند بارهفته (از شنبه تا چهار شنبه)	چند دقیقه و ساعت (از شنبه تا چهارشنبه)	چندبار (پنج شنبه و جمعه)	چند دقیقه وساعت (پنج شنبه و جمعه)
Other (please state)	خیر	بله				
تماشای تلویزیون	خیر	بله				
بازیهای کامپیوتری،پلی استین	خیر	بله				
کار با کامپیوتر و اینترنت	خیر	بله				
تکلیف منزل	خیر	بله				
صحبت کردن با تلفن	خیر	بله				
بازی با اسباب بازی	خیر	بله				
نشستن و حرف زدن	خیر	بله				
گوش دادن به موسیقی	خیر	بله				
نواختن موسیقی	خیر	بله				
بازیهای فکری / کارتی	خیر	بله				
خواندن	خیر	بله				
هنر و مهارت(سفالگری، دوزندگی و رسم	خیر	بله				
بازیهای تخیلی	خیر	بله				
رفتن به مدرسه و برگشتن با ماشین و اتوبوس	خیر	بله				
Other state	خیر	بله				

Children perception of their FMS

What I Am Like

Name________________________ Age____ Birthday _______________ Boy☐ Girl☐

Directions: The following scale is to determine how you feel about your ability in activities that children often participate in for exercise, enjoyment, and during physical education classes.

The first thing you will do is choose which person you are most like for each activity. Once you have chosen who you are most like, then you will decide whether the statement is really true for you or sort of true for you. Thus, for each item, check one of four boxes.

Remember: this is not a test, Please answer all questions as honestly as possible. Nobody will see your answers, or know how you responded.

	Really True For me	Sort of True For me				Sort of True For me	Really True For me
1.	☐	☐	Some kids do very well at all kinds of sports	BUT	Other kids don't feel that they are very good when it comes to sports	☐	☐
2.	☐	☐	Some kids wish they could be a lot better at sports	BUT	Other kids feel they are good enough at sports	☐	☐
3.	☐	☐	Some kids think they could do well at just about any new sports activity they haven't tried before	BUT	Other kids are afraid they might not do well at sports they haven't ever tried	☐	☐
4.	☐	☐	Some kids feel that they are better than others their age at sports	BUT	Other kids don't feel they can play as well	☐	☐
5.	☐	☐	In games and sports some kids usually watch instead of play	BUT	Other kids usually play rather than just watch	☐	☐
6.	☐	☐	Some kids don't do well at new outdoor games	BUT	Other kids are good at new games right away	☐	☐
7.	☐	☐	Some kids do well at games that involve kicking balls	BUT	Other kids don't feel that they do well at games that involve kicking balls	☐	☐
8.	☐	☐	Some kids do well at games that involve catching balls	BUT	Other kids don't feel that they do well at games that involve catching balls.	☐	☐
9.	☐	☐	Some kids wish they were able to run fast	BUT	Other kids feel they are able to run fast.	☐	☐
10.	☐	☐	Some kids do well at games that involve overhand throwing	BUT	Other kids don't feel that they do well at games that involve overhand throwing.	☐	☐

11.	☐	☐	Some kids do well at games that involve underhand throwing	BUT	Other kids don't feel that they do well at games that involve underhand throwing.	☐	☐
12.	☐	☐	Some kids feel they are not able to jump far	BUT	Other kids feel they are able to jump far.	☐	☐
13.	☐	☐	Some kids are good at dribbling or bouncing balls	BUT	Other kids do not feel they are good at dribbling or bouncing balls.	☐	☐
14.	☐	☐	Some kids do well at games that involve striking (hitting) a ball	BUT	Other kids do not feel that they do well at games that involve striking (hitting) a ball.	☐	☐
15.	☐	☐	Some kids do not feel they are able to gallop well	BUT	Other kids feel they are able to gallop well.	☐	☐
16.	☐	☐	Some kids can leap far	BUT	Other kids don't feel that they are able to leap far.	☐	☐
17.	☐	☐	Some kids don't feel they are able to hop well	BUT	Other kids feel they are able to hop well.	☐	☐
18.	☐	☐	Some kids can side gallop well	BUT	Other kids don't feel that they are able to side gallop well.	☐	☐

Please tell us how you describe your weight status:

1. Very underweight
2. Underweight
3. About the right weight
4. Overweight
5. Very overweight

Thank you very much for your time and effort.

Translation of children perception of their FMS

نام و نام خانوادگی: سن: تاریخ تولد: دختر☐ پسر☐

پرسشنامه زیر برای تعیین درک شما در مورد توانایتان در ورزش، لذت بردن از فعالیتهای بدنی، و در طول کلاس های تربیت بدنی و ورزش است.
ابتدا هر سوال را به دقت خوانده یکی از گزینه ها را انتخاب کرده،سپس گزینه مورد نظر (الف یا ب) را انتخاب نماییدو سپس یکی از ☐ تاحدودی درست است و یا کاملا درست است راعلامت بزنید.

	کاملا درست	تاحدودی درست	گزینه الف		گزینه ب	تاحدودی درست	کاملا درست
1	☐	☐	بعضی بچه ها در همه ورزشها عملکردخیلی خوبی دارند	اما	بقیه بچه ها در ورزش احساس نمی کنند که درورش خوب هستند	☐	☐
2	☐	☐	بعضی بچه ها آرزو دارند که کاش میتوانستند در ورزش خیلی بهتر باشند	اما	بقیه بچه ها احساس میکنند که به اندازه ی کافی در ورزش خوب هستند	☐	☐
3	☐	☐	بعضی از بچه ها فکر میکنند فقط در هر نوع فعالیت جدید ورزش که قبلا امتحان نکرده اند عملکرد خوبی دارند	اما	بقیه ی بچه ها میترسند از اینکه که ممکن است عملکرد خوبی نداشته باشند در ورزشی که تا کنون امتحان نکرده اند	☐	☐
4	☐	☐	بعضی بچه ها احساس میکنند که در فعالیت های ورزشی خیلی بهتر از همسالان خود هستند	اما	ولی بقیه بچه ها احساس نمیکنند که بتوانند به خوبیه بقیه ی همسالان خود ورزش کنند	☐	☐
5	☐	☐	بعضی از بچه ها در فعالیت های ورزشی به جای اینکه بازی کنند تماشا می کنند	اما	ولی بقیه بچه ها به جای تماشا کردن بازی میکنند	☐	☐
6	☐	☐	بعضی بچه ها در بازیهای جدیدی که در فضای باز انجام میشود عملکرد خوبی ندارند	اما	ولی بقیه بچه ها در بازیهای جدید عملکرد خوبی دارند	☐	☐
7	☐	☐	بعضی بچه ها عملکرد خوبی در ورزشهایی که نیاز به شوت کردن توپ با پا باشد دارند	اما	ولی بقیه بچه ها احساس نمیکنند که در ورزشهایی که نیاز به شوت کردن توپ با پا هست خوب عمل کنند	☐	☐
8	☐	☐	بعضی از بچه ها عملکرد خوبی در ورزشهایی که شامل دریافت توپ با دست هست دارند	اما	گروهی دیگر احساس نمیکنند که در ورزشهایی که نیاز به دریافت توپ با دست میباشد عملکرد خوبی دارند	☐	☐
9	☐	☐	بعضی ازبچه ها آرزو داشتند که میتوانستند سریعتر بدوند	اما	گروهی دیگر احساس میکنند که قادر به دویدن سریع هستند	☐	☐

10	☐	☐	بعضی ازبچه ها در ورزشهایی که نیاز به پرتاب از پایین به بالا میباشند عملکرد خوبی دارند	اما	گروهی دیگر احساس نمیکنند که در ورزشهایی که نیاز به پرتاب از پایین به بالا میباشند عملکرد خوبی داشته باشند	☐	☐
11	☐	☐	بعضی ازبچه ها در فعالیتهایی که نیاز به پرتاب پایین تر شانه یا به سمت پایین باشد عملکرد بهتری دارند	اما	گروهی دیگر احساس میکنند که در فعالیتهایی که پرتاب پایینتر از شانه انجام میشود عملکرد خوبی ندارند	☐	☐
12	☐	☐	بعضی ازبچه ها احساس میکنند که میتوانند خیلی زیاد بپرند	اما	گروهی دیگر احساس میکنند که قادر به پرش زیادی نیستند	☐	☐
13	☐	☐	بعضی از بچه ها در دریبل کردن توپ عملکرد خوبی دارند	اما	گروهی دیگر احساس میکنند که در دریبل کردن توپ عملکرد خوبی ندارند	☐	☐
14	☐	☐	بعضی ازبچه ها در ورزشهایی که نیاز به ضربه زدن به توپ دارند عملکرد خوبی دارند	اما	گروهی دیگر احساس میکنند که عملکرد خوبی در فعالیت هایی که نیاز به ضربه زدن به توپ دارد ندارند	☐	☐
15	☐	☐	بعضی ازبچه ها احساس نمیکنند که به خوبی بتوانند بتازند وبدوند	اما	گروهی دیگر احساس میکنند که میتوانند به خوبی بتازند و بدوند	☐	☐
16	☐	☐	بعضی ازبچه ها قادرند به خوبی جهش کنند	اما	گروهی دیگر احساس میکنند که نمیتوانند جهش زیادی داشته باشند	☐	☐
17	☐	☐	بعضی ازبچه ها احساس نمیکنند که به خوبی بتوانند لی لی کنند	اما	گروهی دیگر به خوبی لی لی میکنند	☐	☐
18	☐	☐	بعضی ازبچه ها به خوبی پابوکس از پهلو را انجام میدهند	اما	گروهی دیگر احساس میکنند که نمیتوانند حرکت پابوکس را به خوبی انجام دهند	☐	☐

لطفا به ما بگویید چگونه وضعیت وزن خود را توصیف می کنید:

☐خیلی لاغر ☐ لاغر ☐ وزن مناسب ☐ اضافه وزن ☐ خیلی اضافه وزن

Appendix E: Cover letter/ Debriefing sheets, informed consent form, and questions to promote interview for study 4

Middlesex University
London Sport Institute

Dear Parent/Guardian,

My name is Sepideh Fazeli, I am currently completing some research which will contribute to my PhD in Sport and Psychology. I am writing to you to invite you to take part in our study on health behavious of children. The results of our previous study showed that some parents are able to accurately percieve factors related to their childs health status and some parents are not able to. Therefore, I would like to invite you for the next study of where we would like to explore and investigate what you think the reason may be for accurate and inaccurate perceptions. It is hoped with further understnading of these mechanisms it will help contricbute to future prevention/intervention programes to reduce childhood obesity and related health concerns.

Your participation in this study will be very minimal and will be in form of interview on how you evaluate childhood obesity, healthy weight and healthy behaviours. The interview is expected to take around 30 minutes and will be based on your availability (any time which is convenience for you) and your preference for the place of the interview. All information will be kept anonymous.

I am therefore writing to you to ask whether you would be willing to participate in this study.

If you are able to participate in this study please fill out the informed consent form (**REMEMBER** to provide your contact details) and return it to the school office by Friday 15th June 2018. We will directly contact you and arrange an interview time. Alternatively you can inform school's office or contact me directly to let us know you are interested to participate.

If you have any questions or would like to discuss any issues further please do not hesitate to contact me or my supervisor (details provided below).

Fatemeh Fazeli Email: F.Fazeli@mdx.ac.uk Tel: 07423633567

Dr Lizi Bryant Email: L.Bryant@mdx.ac.uk Tel: 07814186168

I am looking forward to your participation in this university research project, and thank you in advance for your cooperation.

Thank you for your time

Yours faithfully,

Sepideh Fazeli

Parental Consent form

1. I confirm that I have read and understand the information sheet for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I can withdraw at any time, without giving any reason.

3. I agree that this form that has my name and signature may be seen by a designated auditor.

4. I agree that my non-identifiable research data may be stored in National Archives and be used anonymously by others for future research. I am assured that the confidentiality of my data will be upheld through the removal of any personal identified.

5. I agree to take part in the above study and am happy to be contacted directly by researcher on the details that I have provided below.

6. I am aware that inappropriate behaviours will not be accepted and will result in termination of the interview.

Name of child ------------------- Year Group ---------------

Child’s weight ---------------------- child’s height-------------

Parent/guardian’s name ----------------- Contact No ----------------------

Education--------------

Preferred time to be contacted -------------------------------

Email address --

Date --------------------- Signature -------------------------

Questions used to promote/start interview:

1-**Parents obesity knowledge**

- What is childhood overweight/obesity?
- Is childhood overweight/obesity a problem in this country? Why is it so significant in our community?
- How can you tell if a child is overweight? What are the warning signs that a child is becoming overweight?
- Who do you think is responsible for this issue (Parents, schools, government)? Should parents be concerned about their child's weight problem? Why? What are the problems associated with childhood obesity?
- Why do you think some parents are not aware of their child's weight status/misjudge their child's weight status? What is preventing them from recognising overweight in their children?
- Why might they not want to engage with the issue? Do you think it is problematic to tell parents their child is overweight?
- Do you have any suggestions for how schools or health professionals could make parents aware of their child's weight problem in a sensitive manner?
- What do you think parents can do to keep children from becoming too heavy? What kind of support would be useful from the school or health professionals to prevent childhood obesity?
- How important are children's eating habits? In what ways should parents improve their children's diet to prevent obesity? What are the barriers to this?
- What kind of support would be useful from the school or health professionals to improve children's eating habits?

2- **Parents inactivity (sedentary) knowledge**

- Is inactivity in children a problem in this country? Why? {Why do you think children are becoming more inactive?

- What are the signs of inactivity in children? /How would you say a child is inactive?
- Should parents be concerned about the amount of time children spend sedentary (inactive)? Why? What are the problems associated with being inactive?

- Why do you think some parents are not aware of the amount of time their child is inactive?

- What can parents do to reduce children's inactivity? What are the barriers to this?

- What kind of support would be useful from the school or health professionals to reduce children's inactivity (sedentary behaviours)?

3- Parents physical abilities knowledge

- How would you say a child is active? Why do you think some parents are not aware of the amount of time their child is active?

- How can parents increase children's physical activity? What are the barriers to this? What kind of support would be useful from the school or health professionals to increase children's PA?

- What physical abilities and skills do you think children need to be able to participate in PA or sports? [*Brief explanation about Fundamental Movement Skills (FMS)*]

- What are the signs of good developed FMS skills? / How do you know a child has adequate physical (FMS) skills? How children's FMS skills can be improved? (What are the roles of parents and schools)?

- Do you think parents awareness of their children's physical skills and abilities can help to increase children's participation in physical activity? How?

- Why do you think some parents are not aware of their child's physical skills and abilities?

Translation of Consent form, cover letter/ Debriefing Sheets and questions for study 4

Translation of parental consent form

فرم موافقت والدین

1. من تأیید میکنم که برگه اطلاعات برای مطالعه فوق را خواندم و این فرصت را داشتم که سؤال بپرسم.
2. من درک می کنم که مشارکت من داوطلبانه است و من می توانم در هر زمان بدون هیچ گونه دلیلی انصراف دهم.
3. من موافقم که این فرم که اسم و امضای من را دارد ممکن است توسط حسابرس تعیین شده دیده شود.
4. من موافقم که داده های پژوهشی غیر قابل شناسایی من بتوانند در آرشیو ملی ذخیره شوند و به صورت ناشناس توسط دیگران. من اطمینان دارم که از طریق حذف مشخصات شناسایی اطلاعات من محرمانه است. برای تحقیقات آینده استفاده شود
5. من موافقم که در مطالعه فوق شرکت کنم و موافقم که محقق به طور مستقیم از طریق جزئیاتی که من در زیر ارائه کرده ام، با من تماس بگیرد.
6. من می دانم که رفتارهای نامناسب پذیرفته نخواهد شد و منجر به خاتمه مصاحبه خواهد شد

اطلاعات مربوط به کودک:

سن کودک -----------کلاس ---------- جنسیت -------- قد ------- وزن--------

اطلاعات مربوط به والد / مراقب :

رابطه پر کننده فرم با کودک : پدر □ مادر □ غیره □

سن والد / مراقب -------- تحصیلات ---------- تلفن---------

------------- تاریخ --------- امضا

تشکر فراوان از همکاری شما

کد شرکت کننده:

Translation of questions to promote interview

سوالات استفاده شده برای شروع مصاحبه:

آگاهی والدین از چاقی

1. چاقی و اضافه وزن در دوران کودکی چیست؟
2. آیا اضافه وزن یا چاقی در دوران کودکی در این کشور یک مشکل است؟ چرا در جامعه ما خیلی چشم گیراست؟
3. چگونه می توان گفت که یک کودک دارای اضافه وزن است؟ آیا علائم هشدار دهنده ای وجود دارد که یک کودک در حال افزایش وزن(چاق شدن) است؟
4. به نظر شما چه کسی مسئول این موضوع است (والدین، مدارس، دولت)؟ آیا والدین باید در مورد مشکل وزن کودک خود نگران باشند؟ چرا؟ مشکلات مربوط به چاقی کودکان چیست؟
5. شما فکر می کنید چرا برخی از والدین از وضعیت وزن فرزند خود آگاه نیستند یا وضعیت وزن فرزندشان را به درستی تشخیص نمیدهند ؟ چه چیزی باعث جلوگیری از تشخیص آنها از اضافه وزن کودکانشان میشود؟
6. چرا ممکن است آنها تمایل به مشارکت در این موضوع نداشته باشند؟ آیا فکر می کنید اگر به والدین گفته شود فرزندشان اضافه وزن دارد مشکل ساز است ؟
7. ما چه پیشنهادی برای مدارس و یا متخصصین بهداشتی دارید که بتوانند والدین را از مشکل اضافه وزن فرزندشان بدون ایجاد نگرانی و حساسیت آگاه کنند ؟
8. به نظر شما چگونه والدین می توانند برای جلوگیری از اضافه وزن به فرزندانشان کمک کنند؟ و چه نوع حمایتهایی از طرف مدرسه یا متخصصان بهداشت برای این امر مفید است؟
9. عادات غذا خوردن کودکان چقدر مهم است؟ والدین از چه طریقی میتوانند رژیم غذایی فرزندانشان را بهبود بخشیده تا از چاق شدن آنها جلوگیری کنند؟ چه موانعی بر سر این راه هستند؟
10. چه نوع حمایتی ازطرف مسؤلین مدرسه یا متخصصان سلامت برای بهبود عادات غذا خوردن کودکان مفید خواهد بود؟

آگاهی والدین ازعدم فعالیت (بی تحرکی)

1. آیا عدم فعالیت (بی تحرکی) کودکان در کشور ما معضل است؟ چرا؟ به نظرشما چه دلایلی برای عدم تحرک کودکان وجود دارد؟
2. نشانه های عدم فعالیت (بی تحرکی) در کودکان چیست؟ / چگونه می توان گفت یک کودک بی تحرک است؟
3. آیا پدر و مادر باید در مورد مدت زمان بی تحرکی بچه ها نگران باشند؟ چرا؟ مشکلات مربوط به عدم فعالیت (بی تحرکی) بچه ها چیست؟
4. به نظر شما چرا برخی از والدین از مدت زمانی که فرزندشان بی تحرک است آگاه نیستند؟
5. والدین چه کارهایی را برای کاهش بی تحرکی کودکان می توانند انجام دهند؟ موانع چیست؟

6. چه نوع حمایتی ازطرف مسؤلین مدرسه یا متخصصان سلامت برای کاهش بی تحرکی کودکان مفید خواهد بود؟

آگاهی والدین از توانایی های فیزیکی

1. والدین چگونه می توانند فعالیت بدنی کودکان را افزایش دهند؟ موانع چیست؟ چه نوع حمایتی ازطرف مسؤلین مدرسه یا متخصصان سلامت برای افزایش فعالیت بدنی کودکان مفید خواهد بود؟
2. شما فکر می کنید بچه ها چه توانایی و مهارت های فیزیکی نیاز دارند تا بتوانند در فعالیت بدنی یا ورزش شرکت کنند؟ (توضیح مختصری در مورد مهارت های حرکتی بنیادی)
3. نشانه های مهارت های حرکتی بنیادی خوب توسعه یافته چیست؟ / چگونه می دانید کودک دارای مهارت های فیزیکی کافی است؟ چگونه مهارت های حرکتی بنیادی کودکان را می توان بهبود داد؟ نقش والدین و مدارس چیست؟
4. آیا فکر می کنید آگاهی والدین از مهارت و توانایی های فیزیکی فرزندان می تواند به افزایش مشارکت کودکان در فعالیت های بدنی کمک کند؟ چطور؟
5. به نظر شما چرا برخی از والدین از مهارت و توانایی های فیزیکی کودک خود آگاهی ندارند؟

Appendix F: Approval of collaboration from University and access to data ollection in schools in Iran

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Subject: Fazeli
From: "rokhsareh.badami" <rokhsareh.badami@khuisf.ac.ir>
Date: Fri, 11/18/2016 10:34 PM
To: r.x.cohen@mdx.ac.uk
Cc: fazeli.s@gmail.com

Dear Dr Cohen,

This is to confirm that I have reviewed the proposal for conduct a research project by Sepideh (Fatemeh) Fazeli entitled “Physical activity, weight status and fundamental movement skills (FMS): actual versus perception of children and parents” in Iran. I have discussed this with colleagues at university and we are happy to collaborate with Sepideh to conduct her research in Iran. Please do not hesitate to contact me if you require further information.

Regards,
Rokhsareh Badami
Associate Professor of Motor Behavior
Department of Physical Education and Sport Science,
Isfahan Branch, Islamic Azad University, Isfahan, Iran

دانشگاه آزاد اسلامی واحد خوراسگان(اصفهان)
دانشکده تربیت بدنی و علوم ورزشی

Dear Dr Cohen
I am writing this letter upon request from Sepideh (Fatemeh) Fazeli to confirm that me (Rokhsareh Badami) and my colleague (Ensiyeh Fanaei) would be delighted to continue assisting Sepideh with her research in schools in Iran. If you require further information please do not hesitate to contact me.

Rokhsareh Badami
Associate Professor of Motor Behavior
Department of Physical Education and Sport Science,
Isfahan Branch, Islamic Azad University, Isfahan, Iran'

Letter from Physical Education Ministry

اداره کل آموزش و پرورش استان اصفهان

باسمه تعالی

اصفهان پایتخت فرهنگ و تمدن ایران اسلامی.

هیچ گنجی سودمندتر از دانش نیست. حضرت علی(ع)

شماره داخلی : ۱۷۰۰/۱۳۶۳۵۷/۳۱۰

تاریخ : ۱۳۹۷/۰۳/۲۸

با سلام و احترام

پس از حمد خداوند متعال و درود و صلوات بر محمد و آل محمد، گواهی می شود با انجام پژوهشی با عنوان " ادارک والدین از چاقی کودکان" در دبستانهای پسرانه [redacted] و دخترانه [redacted] توسط خانم فاطمه (سپیده) فاضلی موافقت می گردد.

مجتبی نوریان

رئیس اداره تربیت بدنی وفعالیت های ورزشی

اداره کل آموزش و پرورش استان اصفهان

اداره تربیت بدنی

خیابان باغ گلدسته بلوار هشت بهشت تلفن : ۳۲۲۲۶۰۰۱ (۱۱خط)

نمابر : ۰۳۱۳۲۲۱۹۷۶۱ کد پستی : ۸۱۴۵۸۱۳۳۳۱ ایمیل:Dbr۱۷۰۰@isfedu.ir سایت: http:/service.isfedu.ir