Child Obesity

Child Obesity:

Challenges and Opportunities for Change

By

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FOREWORD

Firstly, I would like to thank you for being interested in this book. Children are our most precious resource, and at the moment they are at the epicentre of the obesity epidemic.

Childhood obesity is one of the most serious problems facing the developed world. It is damaging to the medical and psychological well-being of our children and casts a shadow on their future health as adults, leading to serious illness and ultimately premature death.

This book explores the different causes of obesity, past and current approaches to managing child obesity, the role of ultra-processed foods, the role of marketing to children, the role of health professionals, and some of the challenges of overseeing and solving this public health issue and should be used in looking at managing obesity rather than left on the shelf to gather dust like some medical books.

Its pages should become well-thumbed by front-line health care professionals, students, commissioners, and policymakers alike. It would even be acceptable to turn back the corners of the pages and use light pencil markings on the margin to highlight important passages, because unlike many volumes, this represents first-hand experiences of practical childhood obesity management, combined with a scientific, clinical, and social appreciation of the condition and its ramifications.

This book is not just for the students, it is for everyone and anyone who is interested in helping children develop effectively, from parents to grandparents, to nursery staff and child minders – if you look after or work with children, this book is written for you.

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INTRODUCTION

Many countries from around the world, especially those in the West, are in the middle of a widespread obesity problem (WHO, 2019) (WHO, 2024). Childhood obesity in particular is now recognized as one of the most challenging public health concerns of the 21st century. This public health concern affects both high income countries and low- and middle-income countries, with a prevalence that has increased at an alarming rate. Globally in 2016, the number of overweight children under the age of five was estimated to be 37 million (WHO, 2024).

In the United Kingdom (UK) alone, the National Child Measurement Programme (NCMP, 2023) (NHS Digital, 2024) stated that over a fifth of reception children were overweight or obese. In year 6 it was over a third. The prevalence of obesity has increased over the years in both reception and year 6. In reception it increased to 9.3% from 9.1%, and in year 6 to 19.8% from 19.1%.

Children in today's world are growing up in an obesogenic environment that promotes weight gain and obesity. The factors leading to an energy imbalance are changes in food quality and affordability, marketing, and decline in physical activity due to much more time being spent on sedentary leisure activities (WHO, 2019). These were greatly impacted in 2020 by COVID-19 lock-down policies as families were not allowed to leave their homes. The limited access to physical activity, and the impact of furloughing led to problems in accessing affordable healthy foods.

The obesity epidemic cannot be easily dismissed as insignificant. It matters because of the severe impact being overweight or obese can have on an individual's health both in the short and long term. Being overweight and obese is associated with an increasing risk of diabetes, cancer, and heart and liver disease among others; and the risks get worse the more overweight people become. They are also important due to the

pressure such illnesses put on families, health care systems, and society, with overall costs to society forecast to reach the billions (WHO, 2019) (WHO,2024).

Becoming overweight and obese occurs when there is an imbalance between energy intake and expenditure. This imbalance can have an effect in children in a matter of years, and the regulation of energy balance is a highly complex matter. The process involves societal, cultural, and behavioural influence, and it is also affected by psychological, genetic, and hormonal factors. The tendency to become obese can be inherited, and the responsiveness to dietary intervention can be genetically determined (PHE, 2019) (The King's Fund, 2021).

Children with overweight or obese parents have a greater risk of obesity, which may have both genetic and environmental components. Also, according to The Health Foundation (2020), there is a strong social gradient of obesity among women. As an example, the incidence of obesity among women in disadvantaged groups was higher than in the more affluent groups (Candio et al., 2023). It is worth noting that a report Inequalities of Health (1998) was commissioned to examine just how much of an issue health inequalities are in countries such as the U.K.

While the 20 years prior to 1997 had seen a marked increase in prosperity and substantial reductions in mortality in the country, the health gap between those at the top and bottom of the social scale has widened. Child obesity rates are therefore also linked to family income and socio-economic group. Children are growing up in an increasingly overweight environment, particularly in disadvantaged areas, with evidence of a strong relationship between deprivation and childhood obesity (CRED 2021) (Candio et al., 2023). Analysis of data from the National Child Measurement Programme (NCMP, 2016) (NCMP, 2023) shows that obesity prevalence among children in Reception increases with increased socioeconomic deprivation.

The shifting patterns of our lives, which impacts food consumption and physical activity, is also making it more and more challenging for our

society and especially our children to maintain a healthy weight. From the nature of the food that we eat, to the surrounding environment and the way children lead their lives, modern life is making it harder for all of us to fulfil our goal of staying healthy and well (DHSC, 2020).

As the report further points out, our society is facing a public health problem that some health professionals see as comparable to climate change in both scale and complexity. Thus, tackling this issue will encompass making progress in a wide range of areas, and as a society we will only revert this trend over some period rather than overnight (PHE, 2019) (DHSC, 2020).

This book aims to explore the different causes of obesity, current approaches to managing child obesity, the role of ultra-processed foods, the role of marketing to children, the role of health professionals, and some of the challenges of overseeing and solving this public health issue. The book will then further present the analysis of the gathered data and discuss how it relates to the existing research and literature on the issue of childhood obesity. Some conclusions and recommendations will be drawn for Health Promotion initiatives.

The book also aims to explore how we got here, what the current issues are, what parents and health professionals think of child obesity prevention programmes, and what some of the potential recommendations are to improve health outcomes for our children. Further consideration will also be given to potential difficulties or barriers that may impact on the obesity issue in respective countries.

CHAPTER 1

BMI DATA AND PREVALENCE OF CHILD OBESITY

AMALIA BURCA BOUCH

This chapter will examine:

- *What is BMI?*
- *How BMI is calculated*
- *The role of the National Child Measurement Programme (NCMP)*
- *Global and regional trends in overweight*

BMI

Many health professionals would argue that childhood obesity is not a simple condition to define. It is a complex chronic (long-term) condition that occurs when a child is above an ideal weight for their age, height, and sex assigned at birth. It could be described as an excess of fat deposits; however, difficulties created by considerations such as gender, age, ethnicity, and developmental variability in children, means that it is challenging to decide a standard BMI calculation compared to adults.

Body Mass Index (BMI) is the value received from the weight (mass calculated in kg) and height of an individual (calculated in meters). To be more specific, the BMI is defined as the body mass divided by the square of the body height, and thus it is shown in units of kg/m2. This is

commonly held as a suitable measure of an individual's obesity. In adults, it is equally applicable to both men and women; however, women have on average over 10% more body fat compared to men. Overall, the BMI has proven to be a solid indicator when applied to overweight and obesity in the context of epidemiology. BMI in adults has been beneficial, as the classifications are closely associated with all-cause mortality (NHSE, 2024).

BMI can be described as not only a safe marker for levels of body fat, but it is moderately easy to calculate. As a result, it is used for population surveys and by health professionals when measuring patients. BMI is therefore the most used measure for calculating whether adults or children are obese, overweight, underweight, or a healthy weight.

BMI is a good predictor of overweight in adults because it can plot one constant (height) against one variable (weight). Since weight variations under normal circumstances vary due to shifts in body mass, BMI remains a good measurement of overweight in adults at the individual and population level. However, in the case of measuring children, the BMI is a less reliable model (NHSE, 2024).

Calculating children's BMI is more difficult than for adults because a child's BMI changes as they mature. Growth patterns differ between boys and girls, so both the age and sex of a child needs to be considered when estimating whether BMI is too high or too low. Children have two variables (height and weight) as well as growing at differing rates and depositing fat and lean tissues in a nonlinear relationship. Growth is not only gender specific, but age specific (PHE, 2019).

The UK has thus implemented a set level of data laid down in 1990 – the Child Growth Charts (RCPCH, 2013) for body mass index in children covering birth to 20 years of age. These charts incorporate nine centile curves created on divisions of two thirds of a standard deviation; therefore, varying from 0.4th to 99.6th centile. There are two charts, one specific to boys and one to girls' growth patterns although the gender differences are small.

The UK standard BMI centile charts present body weight adjusted for height, gender, and age in children. They were obtained from a universal population of UK children in the late 1980s and were the main charts in use until 2009 (RCPCH, 2009). In the context of a public health perspective and for epidemiological targets, those children who surpass the 85th percentile are categorised as overweight and those above the 95th percentile as obese. Children who are classified as severely obese have a BMI > 99.6 centile (RCPCH, 2013).

Useful links to look up:

BMI Percentile Charts - Girls
https://www.rcpch.ac.uk/sites/default/files/Girls_0-4_years_growth_chart.pdf

BMI Percentile Chart - Boys
https://www.rcpch.ac.uk/sites/default/files/Boys_0-4_years_growth_chart.pdf

https://www.gov.uk/government/publications/differences-in-child-obesity-by-ethnic-group/differences-in-child-obesity-by-ethnic-group

National Child Measurement Programme (NCMP)

The UK government implemented an important strategy to evaluate the growing levels of childhood obesity via the National Child Measurement Programme (NCMP) for England in 2006. This compulsory activity was established during the 2006/7 school year and presently sees an average of 95% of children in Reception and Year 6 having their BMI measurement taken (Office for Health Improvement and Disparities, 2022). The data collected by the NCMP does not provide resolution to the obesity issue; however, it is a consistent and prevalent approach of measuring childhood

obesity levels in the UK. There is also an unaccounted percentage of children who do not have their BMI measured (their parents have opted them out); therefore, potentially underestimating the scale of the problem.

The NCMP measures every year the weight and height of children in reception (age 4 to 5 years) and year 6 (age 10 to 11 years) in primary schools in England. This is an excellent source of surveillance data that allows for better identification of the problems and developments in overweight and obesity in the child population (NHS Digital, 2021).

NCMP falls under the directorship of the Office for Health Improvement and Disparities (formerly Public Health England), and the data is analysed and reported by NHS Digital. The data related to the prevalence of overweight and obesity in children is further explored at the local authority level, for Integrated Care Board (ICB) characteristics, and regions in England.

Data is presented related to local authority level inequalities using the Reception and Year 6 prevalence of obesity/severe obesity. The occurrence of obesity by sex, ethnic group, and deprivation quintile can be investigated within local authorities in the Inequalities Data view of the Obesity Profile. The Inequalities Data view also has available England and regional figures separated by sex, ethnic group, and area deprivation.

Data related to high child obesity areas within local authorities will ideally lead to support planning and distribution of services for children, as well as the targeting of resources at a local level to assist in the lowering overweight and obesity prevalence (OHID 2022).

According to NHS Digital (2021), obesity rates in both reception-aged and year 6 schoolchildren increased by around 4.5 percentage points between 2019-20 and 2020-21 – the highest annual rise since the National Child Measurement Programme began.

The National Child Measurement Programme, England – 2020-21 report, by NHS Digital (2021), found obesity prevalence among four and five-

year-olds in reception classes rose from 9.9% in 2019-20 to 14.4% in 2020-21.

In 2006-07 - the earliest year for which comparable data is available for this age group - obesity rates stood at 9.9%. Among year 6 pupils, who are aged 10 and 11, obesity prevalence increased from 21.0% in 2019-20 to 25.5% in 2020-21. The earliest comparable figures for this age group are from 2009-10, when obesity prevalence was 18.7% (NHS Digital, 2021)

The Health Survey for England in 2017 reported that ethnic inequalities in obesity prevalence are on average greater in Year 6 than in Reception. According to the report there are decreased discrepancies between the sexes in Reception than in Year 6. More work is required in this area, and the breakdown between age groups, sexes and ethnic groups can be found in a study by (PHE, 2019).

According to OHID (2022), there was an increase in child obesity and severe obesity occurrence in 2020 to 2021 following the COVID-19 pandemic; however, more data is needed to know whether this is a long-term increase.

The principal increases in the occurrence of obesity and severe obesity in boys and girls have arisen in the most underprivileged parts of England. There is a robust association between weight and deprivation. Children from more disadvantaged backgrounds do experience higher occurrence of obesity. This data is accessible using the 2019 Index of Multiple Deprivation (IMD), a measure of comparative deprivation for small areas OHID (2022).

Global and regional trends in overweight

The UK is not the only country with a growing child obesity problem. Close to one-third (31%) of children aged 5-9 years living in OECD (Organisation for Economic Co-operation and Development) countries are overweight. In the United States, Italy, New Zealand, and Greece, this figure exceeds 40%. When looking at countries such Estonia, Lithuania,

Japan, Switzerland and Latvia, rates are under 25%. The ratio of overweight boys surpasses that of girls in 38 of the 43 OECD and nations surveyed. Nations with the highest gap amongst genders are China, Korea, Poland, the Czech Republic, and the Slovak Republic (above a 10-percentage point difference) OECD (2019).

The ratio of children who are overweight expanded from 20.5% to 31.4% among 35 OECD countries between 1990 and 2016. The largest growth was noted in Poland, Turkey, Hungary, Slovenia, and the Slovak Republic whose rates increased by more than 100%. Comparable developments were noted in non-OECD countries. Growth in these countries was typically higher, which reflects their relatively low starting value. The percentage of overweight and obese children in Indonesia, South Africa and India grew by over 600%; however, their starting values were just 2.4%, 2.3%, and 1%, respectively OECD (2019).

Current evaluations of data related to child obesity under the age of 5 years were published jointly by UNICEF, WHO and the World Bank in April 2019 and 2024. Internationally, the incidence of overweight increased moderately, from 4.8% in 1990 to 5.9% in 2018, but with estimates for low and middle-income United Nations regions showing assorted trends (World Health Organization, 2024).

In Africa, overweight incidence did not change much between 1990 and 2018. However, prevalence increased in Northern and Southern Africa, as well as increased modestly in Middle Africa. In Latin America and the Caribbean, overweight incidence heightened, including with increases seen in Central and South America. In Oceania (excluding Australia and New Zealand) the incidence of overweight became much more severe, with a three-fold increase in prevalence (Di Cesare, 2019).

Between 1980 and 2015, at international level the incidence of obesity has risen from 3.9 to 7.2% in boys and from 3.7 to 6.4% in girls aged 2–4 years. For boys, the second highest occurrence of obesity in this age group was in Kuwait, followed by Qatar and Kiribati. For girls, the lowest occurrence of obesity was seen in North Korea, followed by Eritrea,

Bangladesh, and Burundi. In boys, the lowest occurrence was in Eritrea, followed by North Korea, Burundi, and Bangladesh (Di Cesare et al, 2019).

By 2022, around 37 million children under 5 years of age were overweight. In Africa, the figure for overweight children under 5 years has increased by nearly 23% since 2000. Roughly half of the children under 5 years who were overweight in 2022 lived in Asia (WHO, 2024).

According to WHO (2024), over 390 million children and adolescents aged 5–19 years were overweight in 2022. The incidence of overweight in children and adolescents aged 5–19 increased radically from just 8% in 1990 to 20% in 2022. The rise has occurred similarly among both boys and girls: in 2022, 19% of girls and 21% of boys were overweight.

Shifts in food processing technology, as well as the rising commercialisation of food has unfortunately intensified the intake of processed foods globally. This has further led to greater calorie consumption and thus weight gain in adults and children.

The United Kingdom has the third highest level of obesity in Europe, and is also third highest in the G7, behind only Canada and the US. As mentioned, although obesity has risen across the globe due to factors such as human biology and recent shifts in global food systems and lifestyles, its rise in the UK has been particularly steep. It is now heavily concentrated in the poorest areas and is increasingly prevalent among children, compounding existing inequalities.

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CHAPTER 2

DEVELOPMENT OF CHILD OBESITY AND THE CONSEQUENCES

AMALIA BURCA BOUCH

This chapter will examine:

- *Epigenetics*
- *Gestational weight gain*
- *Breastfeeding versus Formula feeding*
- *Foods in early life*
- *Sleep*
- *Physical activity*
- *Consequences of child obesity*

Epigenetics

Epigenetic studies have provided significant information for the greater understanding of the extreme increase in global obesity rates. Occurring evidence imply that environmental exposures cause changes to the epigenome, leading to the spread of obesity risk across generations.

In the early 1940s, British embryologist Conrad Waddington started using the word epigenetics to describe the interface between genes and gene products. Epigenetics thus can be best described as the study of the

chemical changes of particular genes or gene related proteins of an organism.

Chemical compounds can change DNA without changing the basic DNA sequence; these are called epigenetic changes.

It has largely been presumed that epigenetic changes are deleted and reorganised at some phase during early cell division to re-establish the totipotency of the evolving embryo. Over time, increased support has been shown for the idea that epigenetic inscriptions might not be entirely erased between generations, and that it might be impacted by environmental factors (House of Parliament, 2013).

The EPIGENOME holds all the chemical compounds added to the DNA. Chemical compounds found in the epigenome may be caused through dietary or other environmental stimuli. Epigenetic changes can cause genes to be turned on or off thereby altering the production of proteins in some cells.

According to Keller et al. (2023), epigenetic changes can outline how the information in genes is expressed and utilised by cells and these changes in expression may be the key to susceptibility to adult disease. The main form of epigenetic change that is recognised is methylation. Certain nutrients are thought to impact methylation where a ‘methyl group’ is added to a section of DNA, causing that gene to be turned off and no protein produced.

Additional chemical changes augment gene expression. These deviations can continue through life, as well as manifest through generations. An example of this were the offspring born during the Dutch Winter Famine of 1944-45 to undernourished mothers; they have developed advanced stages of obesity and cardiovascular disease with differences in DNA methylation, compared to the general population (House of Parliament, 2013).

To add more context to this tragedy, the final six months of the Second World War, western Holland was impeded by the German army, leading to considerable areas being impacted by famine. At the start of the blockade in November 1944, the sanctioned rationing was 1200 Kcal per day dropping to 580 by February 1945. Those children born during this tragic period were examined at the age of 19, and it was noted that although birth weights were not especially influenced by the famine, their weight was impacted later in life. It was also noted that levels of obesity in these individuals later in life were related to the interval of their vulnerability to the famine. Those who had been subjected to it during the first twenty-seven weeks of pregnancy were twice as likely to be overweight versus individuals not impacted by it. The individuals impacted by it after twenty-seven weeks of pregnancy or in early infancy had 40% less probability of being overweight at the age of 19 years (González-Rodríguez et al., 2023).

Setting the 'blame' for child obesity at the feet of genetics may be problematic as it could lead to resentment at what people see as an unfair burden that they must carry throughout life. Moving forward, ongoing research will hopefully increase understanding of the complex epigenetic alterations involved in obesity. In particular, the aim would be to develop precise obesity-related forecasts that would enable specialists to implement customised weight loss interventions (Keller et al., 2023).

Gestational weight gain

A high maternal gestational weight gain is connected to delivery complications, high risk of post-partum weight retention and obesity, and adverse cardio-metabolic sequelae in women by midlife; therefore, the less weight gain, the better.

As mentioned, the pregnancy and the first months of life are understood to be a vital obesity encoding period. This is when a baby's metabolism is being set and the foetus is adapting to what it identifies as a standard environment. A healthy weight gain during pregnancy, therefore, may be a

main factor in safeguarding the infant from the conditioning effects of extra weight gain.

Data from NHS Digital (2019) on the weight of women at their 10-week appointment indicates that 28% of women are overweight and 22% are obese. Weight loss in pregnancy is not recommended; therefore, these women will potentially continue being overweight or obese through both their pregnancy and birth. According to data from PHE (2018), 38.1% of women living in the most disadvantaged areas are overweight or obese, in comparison with 29.0% of women in the least disadvantaged areas. Data also indicates that 45.9% of black women were overweight or obese, compared to 40% of women of white, Asian, or mixed ethnicities, and only 16.6% of Chinese women.

As we now know, women from deprived areas are more likely to have inferior nutrition and are more likely either to be obese or to show low weight gain during pregnancy (Food Standards Agency, 2007) (NICE, 2023).

Those who are obese when they become pregnant are at a higher risk of challenges during pregnancy and childbirth such as miscarriage, pre-eclampsia, impaired glucose tolerance, gestational diabetes, and potentially maternal death (Centre for Maternal and Child Enquiries and the Royal College of Obstetricians and Gynaecologists, 2010) (Linton et al., 2020).

For overweight or obese pregnant women, or those with a family history of diabetes, taking measures to avoid gestational diabetes is very important. This support can be either: accessing assistance to lose weight, following a balanced diet, and engaging in regular, safe exercise.

Health professionals can access further information via NICE guidelines PH27 (2010, 2017), *Weight Management before, during and after pregnancy* document. This document also incorporates advise on how best to support women entering a pregnancy with a BMI>30, and women considering behaviour change techniques to manage their diet, activity, and weight. This guidance can be accessed at:

https://www.nice.org.uk/guidance/ph27

Activity:

Go to the above link and further explore on whether the guidance is incorporated in your current practice.

Does it shape the local or organizational policies you have currently implemented for behaviour change?

Breastfeeding versus Formula feeding

Breastfeeding has been proven to have a positive effect on child weight status with the strength of association linked to the duration of breastfeeding. Breastfeeding also safeguards against belated obesity as evidenced by breastfed babies who grow more slowly versus those who are formula-fed (North et al., 2022). Data from large epidemiological studies have established the growth-accelerating result of formula over the first 6 months, growth variances among breast-fed versus formula-fed infants can be highest in the first few weeks following the post-natal period (Neves et al., 2021). During this period, breastfed babies tend to lose weight compared to formula-fed babies, who tend to gain weight. The increase in weight among formula-fed babies during these first few weeks post birth, can be a critical factor in the progression of obesity years later, and can also be critical for the programming of obesity (Yan et al., 2014) (North et al., 2022).

One of the reasons may be that the amount of milk consumed in a formula-fed baby is unlimited, whereas that of a breastfed baby is reasonably limited. A formula-fed baby has a greater chance of overfeeding on formula milk, especially if they use the bottle as a soothing mechanism. Formula feeding, unlike breastfeeding, seems to negatively impact self-

regulation of milk intake; therefore, babies who are bottle-fed are more likely to finish the bottle or cup in late infancy compared to breastfed babies (Dewey et al., 2021).

A connection between bottle feeding and other obesogenic activities such as provision of sugary drinks and early weaning has been recognised, and it may be that this collection of activities rather than bottle feeding in seclusion is generating further weight gain (English et al., 2019).

Foods in early life

The first 5 years in childhood is a decisive period for the development of lifelong nutrition related patterns and behaviours. A balanced and healthy nutrition leads to healthy weight and good overall health throughout ones' lifespan. An above average body mass index (BMI) in the first 5 years is putting a child at a considerable risk for developing obesity later in life. The weight of a baby in the first year is a solid predictor of childhood obesity, with data from CEDAR (2019) showing that 90% of children who are obese at 3 years of age are overweight or obese as adolescents.

When it comes to weight later in life, what young children consume in their early years is more important than their nutritional regime later in childhood irrelevant of dietary improvement. An early diet which is subpar and contains processed foods was corelated to greater fat mass by four years of age. A poor diet early in life was connected to inferior learning and cognitive development irrelevant of parents' intelligence or domestic circumstances (Marcus et al., 2022).

In the UK, preschool nutrition has substantially shifted over the past decades, and nationwide nutritional surveys indicate that the dietary consumption of most pre-schoolers is not aligned with national guidance. Unfortunately, the last wide-ranging national survey of the nutritional habits of pre-schoolers and young children was issued in 2011. The National Diet and Nutrition Survey (NDNS) (PHE and FSA, 2018) has accumulated certain dietary facts on children aged 1.5-3 years; however, the sample sizes are often on a smaller scale.

The quality of children's nutritional intake is essential for optimal growth and maturation of the brain. Getting the right number of vitamins, minerals, and micronutrients is important in the realm of brain function. Lack of iron for example leads not only to lower cognitive skills but also to instability in memory, overall lack of attention, and behaviour issues. Deficiencies in minerals such as zinc and iodine, and a lack of vitamins D and B12, are also known to negatively impact brain function and memory (Karavida, 2019).

Sleep

Several studies have evidenced that sleep restriction leads to a collection of metabolic, as well as endocrine, modifications. These could also include reduced glucose tolerance, reduced insulin sensitivity, higher levels of ghrelin, higher evening concentrations of cortisol, reduced levels of leptin, and thus intensified hunger and appetite. Reduced sleep quality therefore appears to be correlated with overweight and obesity in children (Felso et al., 2017) (Morrissey, 2020).

When a child sleeps, the secretion of growth hormones takes place, and this facilitates the build-up of lean muscle tissue which positively effects their metabolism. Those children who stay up late at night are likely to eat more snacks after their evening meal. Also, children with inadequate sleep are prone to be tired the next day leading to a downturn in physical activity (Khan et al. 2015) (Morrissey, 2020).

According to Morrissey et al. (2020), there is strong evidence for correlation between consistently shorter night-time sleep and increase in food responsiveness in childhood. Higher food responsiveness could partly account for the linear relationship between sleep and BMI at age 5 years. Evidence suggests that adequate sleep is an important therapeutic supplement to any child weight management programme.

Physical Activity

As children grow and develop, on top of high levels of physical activity, they also need low levels of sedentary behaviour and adequate sleep each

day. Spending time utilising screen-based devices leads to sedentary behaviour, which has been connected to increased intake of energy-dense snacks, drinks, and fast foods. Based on research on the importance of sleep and minimising sedentary behaviour while maximising exercise, various countries are delivering cohesive guidance and recommendations for movement behaviours across the whole 24-hour period (Thumann et al., 2019).

According to Whiting et al. (2020), data indicates that most children across the 25 countries they analysed participated in active play for at least 60 minutes a day. Prospects for children to participate in active play are contingent on closeness to local parks and the recreational set-ups available to them. Diverse cultural values and parental support concerning active play and sedentary behaviour may explain some disparities, both among countries and for boys compared to girls. Decreased levels of active play among girls versus boys in some countries may also be influenced by divergent socioecological influences be it at family, school, or environment stages (Telford et al., 2016). The overall social setting in playgrounds has also been shown to contribute to gender variances in relation to active play (Reimers et al, 2018) (Whiting et al., 2020).

Sports organisations may also serve in certain countries as a crucial link for physical activity and sport involvement among children. Data from Kokko et al. (2019) found that the number of girls active in weekly sport was on average close to half that of boys which may be due to a lack of a diversity of activities of interest to girls.

Activities such as walking or cycling to school can lead to valuable health benefits. Factors influencing the ability to engage in such activities; however, can depend on school specific timetable, safety of walking or cycling paths, road safety, weather conditions, and being in proximity to free public transport. Safe access to elementary schools within communities, road safety, and weather conditions also play a role.

It is advised that children spend less than 2 hours per day participating in recreational screen time to avoid negative health outcomes (DHSC, 2023).

Too many hours spent in front of the television, or the computer, is associated to overweight children with some research revealing that time contributed to physical activity does not reverse the damaging influence of screen time (Enberg et al. 2019). To further add to this, several research papers have shown that too much screen time adversely impacts children's nutritional habits, steering them mostly to inadequate food choices and lowering of fruit and fibre intake (Tsujiguchi et al. 2018) (Liu et al., 2021).

Parental awareness of weight status in their children

Several aspects of the family food environment are associated with dietary outcomes likely to promote overweight in children. As mentioned earlier, amplified TV viewing time is correlated with higher energy intake, higher levels of snacking, and higher levels of sugary drink consumption, while decreasing fruit and vegetable intake. Parents do not understand that children may not necessarily improve food choice with age and thus need to be provided with additional knowledge and support on how best to approach this issue. Parenting methods around food are influenced by their own unique childhood encounters with nourishment as well as what is conventional in their own cultural set (Ling and Gebremariam, 2023).

Traditionally, by far the biggest issue in the realm of parenting has been a lack of food due to supplies being random and erratic. The foods that were accessible were at times deficient in diversity and energy and potentially prepared in unclean settings. Parents instinctively provide bigger helpings and preferred food stuff to their children while also providing food as a first reaction to crying or distress.

Parents as good role models are strongly correlated with enhanced diet since through consistent display children learn to like foods that they see their parents eating. Children's food choices are also impacted by their parents' insight of nutrition and interest for illness prevention. Consistency of role modelling is crucial for both the intervention and prevention aspect of children's public health programmes in the realm of weight management (Ling and Gebremariam, 2023).

Mothers play a vital role in their children's open-air play and screen-time in the first years of life. Early involvement to progress young children's physical activity while reducing sedentary behaviour should focus on improving pregnant women's own physical activity, cognisance of playing with their child, minimizing their own screen-time, and implementing daily play time for infants after giving birth.

Parents of young children display poor recognition of their child's weight condition with overweight offspring regarded to be normal. Parents have tendency to overestimate how much physical activity their children engage in, and do not appear to fully understand the health dangers of obesity. Given the importance of early programming to prevent obesity this is a worrying trend (Rodrigues et al. 2020).

Understanding the perceptions of parents related to their child's weight will be important in terms of public health service design as well as the ideal interventions from professionals. Parents tend to focus on obstacles to supporting more exercise and a healthy nutrition such as lack of time, tiredness, fussy eating, and children's inclination for sedentary pastimes. Parents know that their actions have an impact on their child's eating habits; however, according to many, being a good role model is difficult due to a lack of time or being challenged by other family members, such as grandparents (Parkinson et al. 2017) (Salas et al. 2021).

Parents also cite mass media and the advertising of unhealthy foods as negative influencers, as well as school meals and classroom snacks. Lack of local and affordable facilities was frequently mentioned as an obstacle to more physical activity, as well as transport difficulties. Concerns around safety were cited such as play equipment, other children, and stranger danger. Economic difficulties were cited healthy foods being less affordable and children's activities often being out of bounds for many parents (Alshahrani et al., 2021).

Parents see many obstacles to attaining a healthy weight in their children and fixate on peripheral effects as the chief influencers of their children