



Weight Management in Adolescents

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ABSTRACT

Approximately one in three adolescents in the United Kingdom is above a healthy weight. Excess weight is associated with both physical and mental health comorbidities and a high likelihood of persistence into adulthood. Behavioural weight management interventions (BWMI) are currently considered the gold standard treatment for adolescents with excess weight; however, they are characterised by high attrition and limited effectiveness within this age group. This thesis aims to examine how we can better support adolescents to achieve and maintain a healthy weight.

I first conducted a secondary analysis of an existing childhood weight management programme delivered in both school and community settings to compare effectiveness. The findings indicated a modest advantage for school-based delivery; however, overall impacts on weight and health outcomes were limited. To explore alternatives to traditional BWMI, I then undertook qualitative interviews with adolescents living with overweight or obesity and their parents to understand their perspectives on weight and weight management. Participants described both external pressure and an internal desire to lose weight, with adolescents' perceptions often shaped by parental attitudes. Existing support systems were frequently viewed as insufficient and at times harmful, whereas positive role modelling was perceived as beneficial. Weight concern emerged as a common and distressing aspect of young people's daily lives. These findings led me to examine the prevalence of weight concern, and its association with desire for support using data from a large school-based survey. This analysis showed that 41% of young people reported weight concern and 30% expressed a desire for weight management support, with weight concern strongly predicting help-seeking. Finally, I investigated the acceptability and uptake of a digital intervention in a feasibility trial of

an app-based programme. Although the trial was not feasible in its current form, the intervention demonstrated promising evidence of effectiveness, suggesting that a digitally delivered approach may be viable with refinement of study procedures and intervention design.

Overall, this thesis showed that existing adolescent weight management services are often misaligned with young people's preferences and experiences. Engagement improves when support is accessible and school-based interventions or digital options may be ways of achieving this. Weight management interventions must also acknowledge the role of weight concern and mental health, rather than focusing on weight alone.

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STATEMENT OF CONTRIBUTION

I declare that this thesis is entirely my own work, completed under the supervision of Professor Paul Aveyard (until Aug 2024), Professor Susan Jebb and Dr Sarah Wane at the Nuffield Department of Primary Care Health Sciences, University of Oxford, and Dr Tanisha Spratt at the Department of Global Health and Social Medicine, Kings College London. I led all aspects of the work presented in this thesis, including the design, conduct, and analysis of all studies, as well as the writing of Chapters and related journal articles. All tables and figures contained within this thesis are my own creation or are appropriately referenced. No part of this thesis has been submitted for any other degree at this or any other University.

Professor Richard Stevens supported the statistical analysis in **Chapter 3**. Shirley Serber-Souza supported data extraction and cleaning.

I designed the study, conducted all the interviews and analysed the data in **Chapter 4**. Transcription was done through an independent transcription service.

In **Chapter 5**, Professor Mina Fazel and the OxWell Study Team designed and distributed the OxWell Survey, although I designed the two questions which I evaluated. Data extraction was done by Dr Simon White on the OxWell platform.

For **Chapter 6**, I led all trial set-up activities and the trial delivery, with input from my supervisory team. The intervention was delivered by me, through the Second Nature platform. Michael Whitman from Second Nature extracted the trial data and I conducted the analysis and interpreted the findings.

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LIST OF ABBREVIATIONS

Abbreviation	Definition
A-EBQ	Adult Eating Behaviours Questionnaire
AFHC	Adolescent Food Habits Checklist
BCW	Behaviour Change Wheel
BMI	Body Mass Index
BWMI	Behavioural Weight Management Intervention
CEW	Complications of Excess Weight
CI	Confidence Interval
COM-B	Capability, Opportunity, and Motivation- Behavioural model
CPCM	Childhood and Puberty Close Monitoring Form
CWCF	Children We Care For
GLP-1	Glucagon-Like Peptide-1
GP	General Practitioner
HCP	Health Care Professional
HCPC	Health and Care Professionals Council
HSE	Health Survey for England
IMD	Index of Multiple Deprivation
ITT	Intention to Treat
LOCF	Last Observation Carried Forward
MRC	Medical Research Council
NCMP	National Child Measurement Programme
NDNS	National Diet and Nutrition Survey
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NIHR	National Institute of Health Research
OR	Odds Ratio
PE	Physical Education
PFL	Palace for Life
PPI	Patient and Public Involvement
PSHE	Personal, Social and Health Education

RCT	Randomised Controlled Trial
RENEWAL	REthiNking approaches to Excess Weight in AdoLoscents
SD	Standard Deviation
SDS	Standard Deviation Scores
TDF	Theoretical Domains Framework
UK	United Kingdom
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

Chapter 1: Introduction
Chapter 2: Healthy Eagles Study
Chapter 3: Qualitative Interview Study
Chapter 4: OxWell Survey Evaluation
Chapter 5: Digital Intervention Feasibility Trial
Chapter 6: Discussion

1.1. Summary

In this chapter I aim to provide the foundation for my thesis. I begin with an overview of overweight and obesity in adolescents, including definitions, current prevalence estimates, factors that contribute to excess weight in this population and the physical, psychological and economic consequences.

Building on this context, the chapter critically reviews current treatment approaches for adolescents with excess weight, including behavioural weight management interventions, specialist services, pharmacotherapy and surgical options. I particularly focus on behavioural weight management interventions including efficacy outcomes, potential harms, barriers to engagement and the introduction of digital options. I finish this chapter by identifying gaps that remain in the literature, leading to the overarching aims of my thesis.

1.2. Overweight and Obesity in Adolescents

1.2.1. Defining excess weight in adolescents

Overweight and obesity in adolescents are typically defined using Body Mass Index (BMI) z-scores, also known as standard deviation scores (SDS).¹ BMI is calculated as

weight in kilograms divided by height in metres squared (kg/m^2) and provides a proxy measure of adiposity. However, because BMI changes substantially with normal growth and development, which is often different between males and females, absolute BMI values are not appropriate for use in children and young people.² BMI z-scores therefore account for age- and sex-specific variation by situating an individual's BMI relative to a reference population.

In the United Kingdom (UK), the UK-World Health Organization (WHO) growth charts are recommended for use as the reference population for calculating BMI centiles.³ While these extend from infancy to the age of 20 years, for children aged 0-4 years they are based on the WHO international growth standards and from 4-20 years these are based off the 1990 UK growth charts, hence the name UK-WHO.⁴ The WHO growth standards are used internationally, based on data collected from six countries and represent ideal standards for growth. In contrast, the UK 1990 growth references are not meant to reflect ideal growth but, instead, growth “as is” and as such, are likely more representative of the UK population.⁵

In the UK, overweight and obesity in children are classified using two sets of BMI centile thresholds derived from the UK-WHO growth charts.¹ First, population-based cut-offs define overweight as a BMI z-score at or above the 85th centile and obesity at or above the 95th centile. These thresholds are primarily used for population surveillance and are intentionally more sensitive, enabling the identification of children at risk of progressing to clinically significant excess weight. In contrast, clinical cut-offs define overweight as a BMI z-score at or above the 91st centile and obesity at or above the 98th centile, and are used to guide individual clinical assessment and management.¹ For the purposes of

this thesis, clinical cut-offs were applied to better reflect levels of excess weight associated with increased clinical risk.

The following clinical cut-offs are used to indicate excess weight:¹

- **Overweight:** BMI 91st centile + 1.34 SDs
- **Clinical Obesity:** BMI 98th centile + 2.05 SDs
- **Severe Obesity:** BMI 99.6th centile + 2.68 SDs

Concerns remain about the precision of all growth charts in older adolescents, particularly those with severe obesity, where growth trajectories may diverge from population norms.⁶ The National Institute of Health and Care Excellence (NICE) recommends the use of the Childhood and Puberty Close Monitoring (CPCM) form for longitudinal tracking of children at the extreme ends of weight.¹ This is based on the UK-WHO growth reference curves and allows clinicians to better track young people living with extreme obesity based on pubertal stage.⁷ However, the form requires the clinician to assess pubertal stage which may not always be accurate or possible, leading to limited clinical adoption. Additionally, while the UK-WHO growth charts extend to 20 years, there is currently no consensus on when to transition from paediatric to adult diagnostic criteria.

A recent Lancet Commission, considered the diagnostic criteria used for clinical obesity and redefined it based on clinical outcomes instead of anthropometric measures.⁸ For young people they recommend using organ and tissue malfunction and/or limitations of daily activities for diagnosis.⁸ While the evidence behind these recommendations was robust, guidance around practical implementation was limited

and, as the recommendation was quite recent, it will likely take significant time before there is widespread adoption in routine care.

1.2.2. Prevalence

Current estimates suggest that a substantial proportion of adolescents in the UK are living with overweight or obesity, although precise national data are lacking. Prevalence of excess weight in primary school children is measured through the National Child Measurement programme (NCMP), a national, opt-out, school-based surveillance programme that measures child weight and height in reception and year 6.⁹ However, no comparable programme exists for adolescents, leaving a significant gap in prevalence estimates and meaning prevalence must be inferred from adult and childhood statistics. Large UK-based surveys, such as the Health Survey for England (HSE) 2022 and a large Bristol-based cohort study, report prevalence rates of approximately 25% and 33%, respectively.^{10,11} These figures are notably lower than those obtained through the NCMP in which 36.1% of Year 6 children (aged 10–11) are classified as living with overweight or obesity.¹² Given that 64% of UK adults are classed as living with excess weight, it is likely that prevalence continues to rise as young people move through adolescence therefore we would expect prevalence in adolescents to be between 36%- 64%.¹¹ Unfortunately, centiles used for diagnosing overweight and obesity in childhood do not segue easily into the absolute values used in adulthood therefore tracking population values from childhood to adulthood has its challenges.^{13,14} However, Despite variability between data sources, the evidence consistently indicates increasing levels of excess weight among young people, with some analyses suggesting as much as a 50% rise since 2008.¹⁰

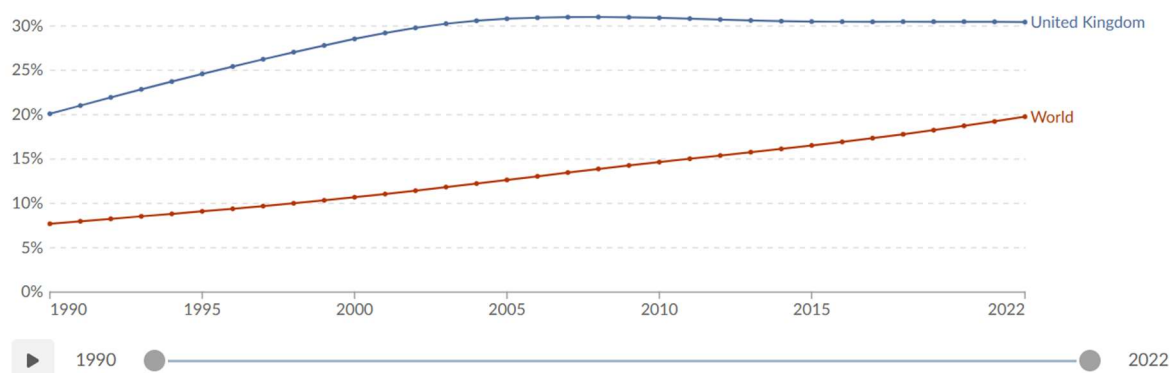


Figure 1.1: Share of children and adolescents (5-19 years) who are living with overweight or obesity.
 Data source: World Health Organization – Global Health Observatory. ©WHO (2025). Licensed under CC BY-NC-SA 3.0 IGO.

Assuming that patterns observed in childhood continue into adolescence, I would also infer that there are likely to be important demographic differences in weight status among young people. NCMP data indicate that while boys and girls have similar rates of overweight, prevalence of obesity in year 6 boys was 24.5% compared to only 19.6% in year 6 girls.⁹ Excess weight is also unequally distributed across social and ethnic groups. Obesity prevalence in year 6 children from the most deprived areas was 29.2% compared to only 13.0% in children from the least deprived areas.⁹ Year 6 children from Black and Asian ethnic groups had obesity rates of 30.4% and 25.0% respectively while rates were only 20.8% in children from White backgrounds.⁹ These disparities are likely to persist through adolescence and make a difference when planning interventions to ensure they target those most at risk.

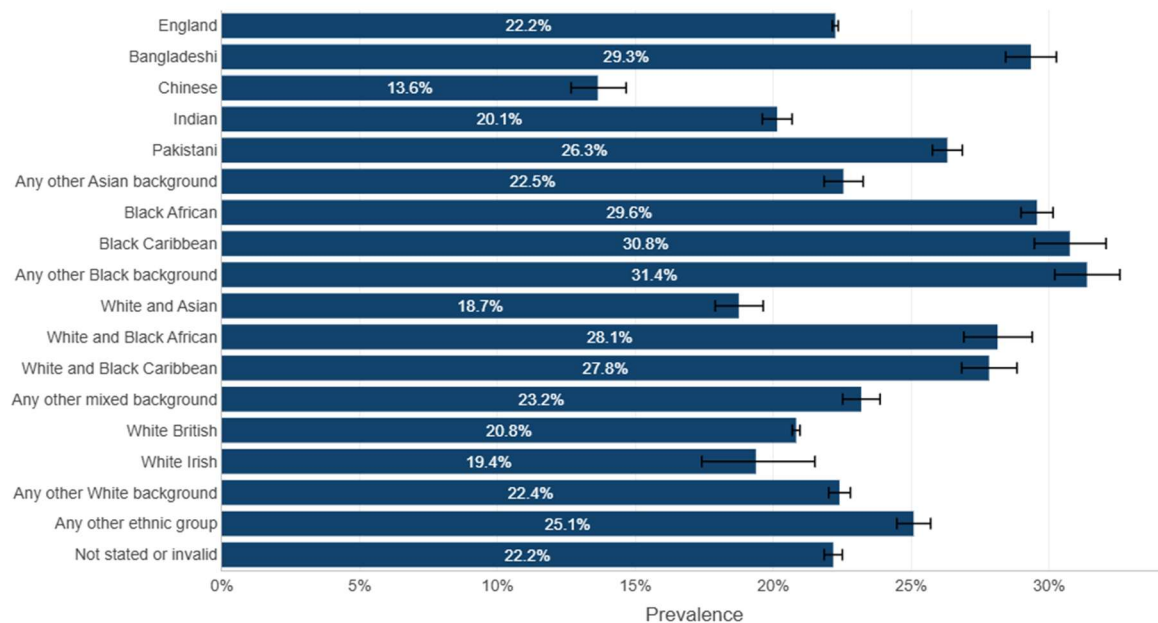


Figure 1.2: Obesity prevalence in year 6 by ethnic group. Source: National Child Measurement Programme, 2024-25 report. ©Crown copyright. Contains public sector information licensed under the Open Government Licence v.3.0.

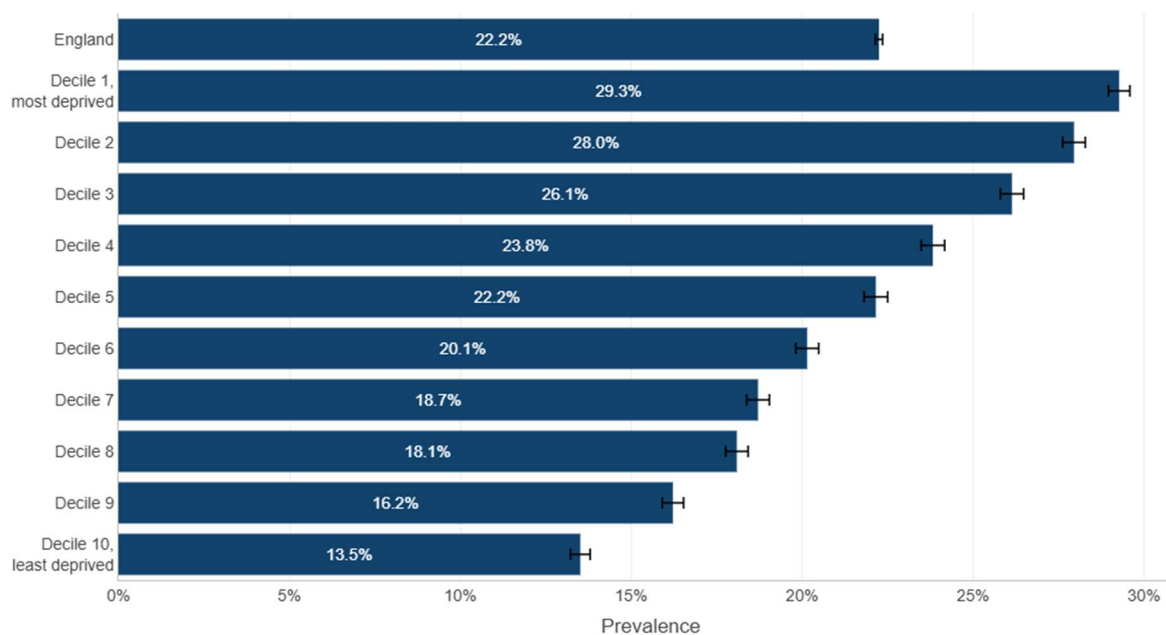


Figure 1.3: Obesity prevalence in year 6 by deprivation decile. Source: National Child Measurement Programme, 2024-25 report. ©Crown copyright. Contains public sector information licensed under the Open Government Licence v.3.0.

1.2.3. Causes and determinants

The causes of obesity in young people are complex and multi-faceted.¹⁵ Individual behaviours such as consumption of energy dense food, inadequate sleep, lack of

physical activity or high levels of sedentary behaviour have a strong impact on weight.¹⁶⁻

²⁰ However, these behaviours do not occur in isolation and are strongly shaped by familial, social, and physical environments, including household practices, neighbourhood characteristics, and the wider food and activity environment.²¹

Diets high in energy-dense foods, which are often consumed by young people, can lead to excess caloric intake, particularly when combined with large portion sizes and limited access to affordable, nutritious alternatives.^{20,22} According to the most recent National Diet and Nutrition Survey (NDNS), only 9% of young people aged 11-18 years are meeting their recommended 5 portions of fruits and vegetables per day compared to 17% of adults; 96% of young people are not meeting fibre requirements.²³ The highest consumption of sugar-sweetened beverages was also in this age group with an average consumption of 124ml per day compared to 54ml/day in younger children and 81% of 11-18 year olds reported buying food or drink at cafes, pubs or takeaways in the last 7 days.²³

At the same time, physical activity typically declines during adolescence due to reduced participation in organised sport, competing academic and social demands, and environmental barriers such as safety and access to green space.^{19,24} In the 2024/25 academic year, only 53% of young people in years 7-8 and 49% in years 9-11 were meeting national physical activity guidelines.²⁵ These numbers were even lower for children from areas of high deprivation or ethnic minority backgrounds.²⁵

This reduction in activity is compounded by high levels of sedentary behaviour, including screen time, gaming, and social media use, which not only displace active pursuits but are also associated with increased snacking and exposure to food

marketing.^{26,27} A UK parliamentary inquiry on screen time published in 2025 showed that young people aged 15-16 years spent on average 5 hours per day on screens leading to negative physical and mental health effects.²⁸

Familial, and particularly parental, factors play a large role in influencing the determinants and behaviours that can lead to excess weight in adolescents.²⁹⁻³¹

Although parental influence typically diminishes during adolescence as young people gain greater autonomy over their food choices and daily routines, the family environment remains a critical context for weight-related behaviours.¹⁶ Evidence also suggests that certain parental health characteristics and early-life exposures are associated with an increased risk of childhood and adolescent overweight. For example, maternal smoking in pregnancy, higher parental BMI or rapid weight gain during pregnancy, and shorter or absent breastfeeding duration have all been linked to elevated risk of excess weight in offspring.³²⁻³⁴

Biological factors can also contribute to excess weight in children and adolescents, although they account for only a small proportion of cases. Endocrine disorders such as Cushing syndrome, growth hormone deficiency, and hypothyroidism may lead to weight gain in a minority of young people.¹⁶ Additionally, identified genetic causes of obesity account for approximately 7% of cases of severe obesity in young people.³⁵ Monogenic and syndromic obesity are caused by rare genetic variants and are typically associated with relatively limited environmental influence.³⁶ These include conditions such as Prader–Willi syndrome and Bardet–Biedl syndrome, as well as single-gene defects affecting energy regulation, including deficiencies in the leptin receptor or the MC4R gene.^{35,36} However for many more children there are interactions between

multiple genetic variants and environmental factors. The specific combination of genetic susceptibility and environmental exposure varies between individuals, and consequently the clinical presentation of obesity is often heterogeneous.³⁵

Disordered eating behaviours are consistently associated with excess weight; however, the direction and nature of this relationship remain unclear, and causal pathways are likely to be complex and bidirectional.³⁷⁻³⁹ Disordered eating is estimated to affect approximately one in five adolescents, with higher prevalence observed among girls and increasing rates across the adolescent years, with typical onset occurring in early adolescence.⁴⁰⁻⁴² Young people are frequently exposed to societal pressures related to weight and appearance, which can contribute to weight-based stigma and the development or exacerbation of disordered eating behaviours.^{43,44} Weight-based stigma may further intensify the relationship between disordered eating and excess weight, as experiences of stigma are linked to both unhealthy weight control practices and poorer weight-related outcomes.^{45,46} Among young people, such stigma is frequently associated with social media influences which are often cited as a causal factor for disordered eating behaviours.⁴⁷⁻⁴⁹

1.2.4. Health and economic consequences

Excess weight in adolescents is associated with a wide range of adverse physical, mental and psychosocial health consequences and contributes significantly to morbidity and early mortality.^{50,51} It is also strongly predictive of obesity in adulthood, with an estimated 80% of adolescents living with obesity remaining so as adults.⁵² This continued exposure to excess weight is one of the leading contributors to ill-health and increases the risk of developing serious long-term conditions throughout adulthood.^{53,54}

Excess weight is associated with a variety of physical health consequences affecting almost every bodily system.^{16,17} Cardiovascular disease, respiratory disorders and endocrine impairment are some of the more severe consequences however the gastrointestinal, musculoskeletal and renal system can all be affected.^{51,55} Additionally, fatty liver disease in the paediatric population is increasingly common with European estimates of 1.3-22.5% of children age 3-18 years effected.⁵⁶ Often these complications only become evident in adulthood however groundwork is often laid early in childhood or adolescence.⁵⁷

Elevated rates of psychiatric comorbidity, including increased symptoms of anxiety and depression and lower self-esteem are all associated with excess weight in young people.^{58,59} These mental health difficulties often occur alongside a range of psychosocial challenges, such as social isolation, weight related teasing, victimisation and bullying, all of which have been shown to contribute to psychological distress.^{60,61} The bidirectional relationship between excess weight and mental health further compounds risk, as emotional difficulties can influence eating patterns and physical activity, while experiences of stigma and discrimination can exacerbate both weight gain and psychological harm highlighting the substantial mental health burden experienced by many young people with excess weight.⁶² Young people experiencing weight stigma are also less likely to seek support from health professionals for physical or mental health concerns, further exacerbating the problem.⁶³

These comorbidities, physical, mental and psychosocial, have a real and measurable economic impact. Excess weight in young people represents an additional economic strain on the health services, including increases in health expenditures by 30% for

children with obesity compared to those with healthy weight.^{64,65} A recent economic evaluation estimated that costs to the National Health Service (NHS) for childhood overweight and obesity may reach £0.3 billion annually with every child living with severe obesity costing an annual excess of £190 per child when compared to healthy weight peers.⁶⁶

Estimating the precise cost of childhood excess weight remains challenging due to considerable heterogeneity in study designs, costing methods and population characteristics.⁶⁷ Demographic factors such as ethnicity, family income, child age and maternal age, as well as clinical factors such as degree of excess weight and presence of comorbidities, all have a significant impact on costs yet are not always included in economic evaluations.⁶⁷ Additionally, as children are growing and changing over time, associated health costs will also change demanding analysis at various time points to create an accurate cost estimate.⁶⁶ Because of this variation, evaluations report a wide range of excess direct healthcare costs, with annual estimates ranging from approximately £89 to £1,829 per child.⁶⁷

A recent economic review found that prevention, prevention–treatment, and treatment interventions for excess weight in childhood are generally cost effective and that interventions implemented earlier in childhood tend to yield greater cost–benefit.⁶⁸ This reflects the fact that preventing excess weight, or reducing BMI to a healthy range during childhood, not only mitigates immediate healthcare costs but also reduces the longer-term burden associated with obesity tracking into adulthood. Childhood and adolescence may be particularly cost-effective period for intervention.

1.3. Review of Current Treatment Options

For adolescents living with overweight or obesity, maintenance or reduction in BMI Z-score is recommended to reduce future clinical risk.¹ Adolescence represents a unique life stage where developmental, emotional, and social factors must be considered in obesity treatment strategies.⁶⁹ All too often, adolescent and childhood weight management interventions are combined, overlooking the distinctiveness of this age group.⁶⁹ Current weight treatment interventions in this age group have limited long-term success, with interventions suffering low uptake and high attrition rates.⁷⁰⁻⁷² This may be because most treatment interventions for excess weight in adolescents are designed by adults and health care professionals and may not reflect adolescents' specific wants or needs.⁷³

1.3.1. Obesity services for adolescents in the UK health system

In the United Kingdom, NICE guidance recommends obesity services are delivered through 3 main models of care (**Figure 1.4**).

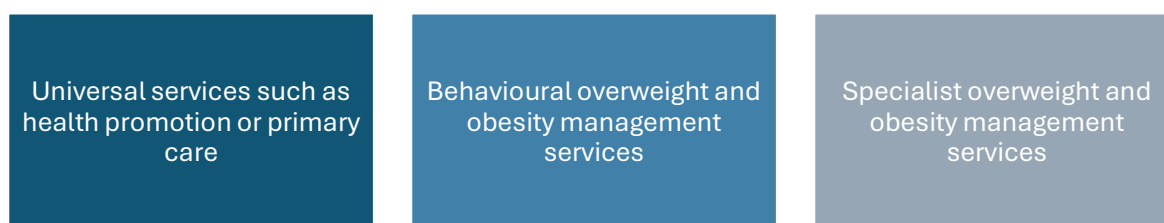


Figure 1.4: Model of obesity care

In the context of adolescents, universal services comprise population-level prevention activities, usually delivered by Local Authorities, which focus on promoting healthy eating, physical activity, and general wellbeing. These initiatives aim primarily to prevent excess weight gain rather than to treat established obesity. Behavioural overweight and

obesity management services are targeted at young people already living with overweight or obesity and generally involve community-based behavioural weight management interventions (BWMI). Such interventions, often delivered directly by Local Authorities or commissioned third-party providers, offer structured support for dietary improvement, physical activity, and behaviour change. They represent the most commonly available treatment for childhood obesity in the UK and are considered the current gold standard of care.¹ The final delivery model constitutes specialist weight management services for young people with severe obesity and associated clinical risk. These services provide comprehensive multidisciplinary assessment, monitoring, and personalised treatment, typically through NHS-based specialty services and may include the use of pharmacotherapy. They can also include bariatric surgery, which is used infrequently in adolescents but remains a potential option in cases of extreme and treatment-resistant obesity. For this thesis I will only focus on overweight and obesity management services with specific attention paid to behavioural services which is the most common form of treatment.

1.3.2. Treatment for severe and complex obesity

1.3.2.1. Specialty services

Young people who present to health services with severe obesity or obesity complicated by associated clinical comorbidities, are typically referred to specialist, clinic-based weight management services. These services, often delivered within the NHS, involve a multidisciplinary team of health professionals who provide comprehensive assessment and intensive, individualised treatment. In the UK, such provision is commonly delivered through Complications of Excess Weight (CEW) Clinics, an NHS pilot programme designed to support children and adolescents living with severe obesity.⁷⁴

The aims of these clinics are to identify the underlying causes of excess weight, diagnose and manage obesity related complications, and develop a personalised, holistic care plan tailored to the needs of each young person.⁷⁴

An ongoing national evaluation is examining the outcomes, implementation and acceptability of CEW clinics. Preliminary findings indicate considerable variation in clinic structure and multidisciplinary team composition across sites.⁷⁴ Early data also suggest that representation from minority ethnic groups and young people from areas of high socioeconomic deprivation are greater than baseline population figures for the UK, with dyslipidaemia and hypertension emerging as the most commonly identified comorbidities.^{74,75}

1.3.2.2. Pharmacotherapy

Pharmacotherapy is typically used as an adjunct to specialist weight management services to enhance treatment outcomes in adolescents with severe obesity, particularly in the presence of obesity related comorbidities. Orlistat, a gastrointestinal lipase inhibitor, is licensed for use in this age group and has been shown to produce modest reductions in BMI, ranging from approximately 0.5 to 5 kg/m² compared with placebo.⁷⁶ However, its clinical utility is limited by frequent gastrointestinal side effects, which commonly lead to poor adherence and early discontinuation. Metformin, a biguanide licensed for the treatment of type 2 diabetes, is also widely prescribed in adolescents with insulin resistance and related metabolic conditions and has been associated with modest weight loss both in young people with and without diabetes.⁷⁷

More recently glucagon-like peptide-1 (GLP-1) agonist analogues such as Liraglutide or Semaglutide have come on the market. Both are licensed for use in young people 12

years and older with obesity but not NICE approved, as there is no technology appraisal for use in adolescents.⁷⁷ Tirzapatide, another GLP-1, is not yet licensed for use for obesity in young people. GLP-1s are given by subcutaneous injection at a daily dose of 0.6 - 3mg for Liraglutide and a weekly dose of 0.25 – 2.4mg for Semaglutide. They work by inhibiting glucagon release, slowing gastric motility and suppressing appetite.⁷⁷ Both have been associated with significant weight loss in randomised controlled trials with adolescents. Liraglutide showed a >5% weight loss in 43.3% of participants at 56 weeks compared to 18.7% of participants with placebo.⁷⁸ Semaglutide showed a >5% weight loss in 73% of participants at 68 weeks compared to 18% of participants in the placebo group.⁷⁹

Early safety data are generally favourable, with nausea and vomiting being the most commonly reported adverse effects; however, further research is required to establish long term safety, tolerability and sustainability of treatment effects in this age group.^{80,81} Further research is also required on how these medications may fit with BWMI and healthy lifestyle advice to promote long-term weight loss maintenance.⁸¹ While the research on GLP-1 use in children and adolescents is growing daily, we still need more research on the acceptability of GLP-1s to adolescents and what adherence might look like in this population before we can understand the full picture.

1.3.2.3. Bariatric surgery

Bariatric surgery is not generally recommended in children and young people and is still extremely rare.¹ However, exceptions can be made for young people that have achieved, or nearly achieved, physiological maturity and have a BMI >40kg/m² or >35kg/m² with significant comorbidities, which may include extreme psychological

distress related to obesity.¹ The surgery should be undertaken by a surgical team with paediatric expertise who are able to provide intensive pre and post-surgical care.¹ The National Obesity Audit shows that only 5 patients under the age of 18 years underwent obesity surgery in the year 2023-24.⁸²

Among adolescents undergoing bariatric surgery, average weight loss typically ranges from 26% to 28% of pre operative body weight and is generally sustained for at least 5 years post procedure.^{83,84} Cardiometabolic outcomes, including improvements in glycaemic control, blood pressure and lipid profiles, appear to be greater in adolescents than in adults, and marked reductions in disordered eating symptoms have also been reported.^{83,85,86} Although symptoms of depression and other mood disorders often improve in the immediate postoperative period, these mental health gains are not consistently maintained at 5 year follow-ups.⁸⁶ Potential adverse effects of bariatric surgery include long term micronutrient deficiencies and gastroesophageal complications, although such events are relatively uncommon when appropriate monitoring and supplementation are provided.^{84,87} Taken together, the substantial and durable health benefits, coupled with the relatively low incidence of serious complications, have led to increasing recognition of bariatric surgery as a viable option and high quality RCTs are limited and therefore more evidence may be required to see a change in practice.^{88,89}

1.3.3. Behavioural weight management interventions

BWMI are recommended by NICE for treating overweight and obesity in young people.¹ These are often 12-week, multi- component interventions delivered in the community to either young people alone or families. Each programme should contain advice on

healthy eating, physical activity and behaviour change delivered in weekly sessions either in-person or online. Outcome goals are an improvement in healthy behaviours and/or a reduction in BMI z-score.

1.3.3.1. Evidence for effectiveness

The majority of studies evaluating the effectiveness of behavioural weight management interventions in paediatric populations have been conducted in children under the age of 12 years, with comparatively limited evidence specific to adolescents. While there may be some overlap in intervention mechanisms across age groups, adolescence is characterised by distinct physical, social and psychosocial developmental changes. As a result, extrapolating findings from younger children to adolescents may be inappropriate and risks overlooking the unique contextual and developmental factors that influence engagement and outcomes in this age group.

Evidence to support the efficacy of BWMI in adolescents, especially in the long term, is limited. A Cochrane review of BWMI for young people 12-17 years showed a mean change in BMI of -1.18kg/m^2 (95% confidence interval (CI) -1.67 to -0.69) favouring the intervention however the quality of evidence was low with high heterogeneity amongst interventions.⁷² A more recent Cochrane review of adolescents aged 10-19 years also showed that multimodal interventions produce only modest benefits, with small improvements observed in BMI z-score, physical well-being, and health-related quality of life after 12 months and limited impact on broader outcomes such as mental well-being and physical activity.⁹⁰ However, it was also noted that the quality of evidence was low with a lack of evidence for ethnically diverse or economically disadvantaged populations.⁹⁰ Subgroup analysis showed no differences between interventions with

and without parental involvement or by intervention setting or mode of delivery.⁷² A component network meta-analysis examining intervention components in this age group found insufficient evidence to distinguish the effects of individual intervention subcomponents on BMI z-score reduction. However, low quality evidence suggested that interventions combining behaviour change techniques with dietary components were more likely to be effective.⁹¹

Many of the programmes that work under trial conditions have a neutral effect when applied to real-world settings.⁹² Specifically, when interventions were delivered at scale, their observed effects were typically less than 75% of those achieved under efficacy trial conditions.⁹² This may be due to factors affecting implementation but it may also be that most studies are conducted in white middle class populations whereas obesity is a disease which disproportionately affects those from ethnic minority and economically deprived backgrounds.⁹

1.3.3.2. Barriers and facilitators to engagement in weight management

In general, adolescents living with excess weight express a desire to lose weight and want the opportunity to do so in a supportive environment.^{93,94} Adolescents are strongly motivated by improvements in health alongside body image, self-esteem and social desirability.^{95,96} There is some evidence to suggest that when weight treatment programmes focus on body weight and follow a prescriptive, standardised model, participants feel despair, shame and uncertainty about their weight. However, when participants are treated as individuals, with a focus on their personal needs that is not weight-based, they feel empowered, safe, and accepting of their bodies.⁹⁴

Barriers to BWMI attendance are often around perceptions of what the intervention may entail. Young people are worried about the intensity of the diet or exercise programme they would be prescribed but also about the feelings of shame and guilt that may come as a result of attending the programmes.⁹⁵ These can be countered by facilitators offering professional support delivered in a personal and tailored way and enjoyable, active engagement such as games and activities.⁹⁵

Social factors are repeatedly mentioned as both a barrier and facilitator to successful weight management. Social ties with others trying to lose weight are cited as increasing motivation.^{97,98} However, peer pressure to participate in unhealthy eating behaviours may create a barrier to weight loss.^{97,99,100} Social and peer influences are more pronounced in girls than boys.^{97,98}

Many adolescents felt that parental involvement was either a facilitator or a barrier to weight loss and were, in general, polarised on the topic.^{97,98} If parents were not seen as supportive of weight treatment, their input could be counterproductive to success. However, supportive parents were seen as increasing likelihood of success in weight treatment.⁹⁷ Often adolescents valued having parental input into their care however also expressed a preference for, at least part of treatment, to take place without parental involvement, possibly reflecting the semi-autonomous life stage of adolescence.¹⁰¹

There were also barriers to accessing weight management programmes expressed by parents such as not recognising weight as an issue, or a belief that there will be adverse psycho-social consequences to attending weight treatment programmes. Qualitative research with parents of overweight children demonstrates a lack of trust in BMI, the

clinical measure used to diagnose overweight and obesity, as an accurate measure of weight status in adolescents and as a consequence they tend to ignore the diagnosis and do not seek treatment.^{102,103} The research indicates that often parents underestimate adolescent weight status and, even when weight status is confirmed, underestimate the clinical risks associated with overweight.¹⁰³⁻¹⁰⁵ In addition to perceived physical limitations, parents also feel that discussing or treating overweight in adolescents will lead to adverse mental health implications. Parents feel that simply raising the issue of weight with their children will increase the child's perceived weight stigma and feelings of weight-based shame.^{93,102,103}

1.3.3.3. Potential harms associated with BWMI in adolescents

Evidence has shown that dieting behaviours in adolescence may lead to negative self-esteem and even contribute to eating disorders.^{106,107} They are also associated with higher BMIs and increased incidence of adverse mental health.^{108,109} However, critics of weight management interventions in adolescents often fail to separate unhealthy self-imposed dieting behaviours from evidence-based weight management programmes supported by qualified health professionals.

Data on adverse events associated with structured BWMI is limited. In a systematic review published in 2017, of the 106 studies included only 5 looked at rates of adverse events and of these, 3 reported no adverse events.⁷² Of the studies that did report adverse events, they reported a rate between 6.4%- 7.9% with most events thought not to be directly attributable to the intervention.^{110,111} The majority of the intervention attributed events were physical harms through exercise and none of the programmes

reported increased psychological harms. However, many of the studies did not specifically look for these harms.

Hiba et al. published a series of papers in 2019 looking specifically at the association between BWMI and eating disorders risk,¹¹² depression and anxiety¹¹³ and self-esteem and body image.¹¹⁴ All of these papers included a systematic review and meta-analysis from interventions where the dependant variable was measured both pre and post by a validated measurement tool. Overwhelmingly these papers showed that BWMI did not contribute to the above risks and actually led to a decreased eating disorder risk as well as mild improvements in body image, self-esteem, depression and anxiety. The conclusion being that structured weight management programmes are beneficial to the mental health of adolescents struggling with overweight and obesity. These findings were also echoed in a much smaller review.¹¹⁵

The evidence suggests that while self-imposed dieting behaviours can lead to disordered eating and reductions in self-esteem, professionally-led BWMI actually have the reverse effect, leading to improvements in these same areas. Therefore, while weight focused “dieting” in adolescents should be discouraged, these same harms are not associated with structured weight management programmes.

1.3.3.4. Digitally delivered interventions

Digital interventions refer to weight management approaches delivered through electronic modalities such as smartphone applications, web-based platforms, wearable technologies, digital gaming or artificial intelligence driven tools.¹¹⁶ These interventions are increasingly being incorporated into health care delivery as a means of reaching larger populations with reduced resource requirements and the NHS 10-Year

Plan advocates for greater use of digital technologies to support community based health care delivery.¹¹⁷ However, despite growing policy and service level interest, the evidence base for digital weight management interventions in adolescents remains limited. Furthermore, substantial heterogeneity in intervention design, delivery modalities and outcome measures make it challenging to draw robust conclusions regarding their comparative effectiveness.

A recent systematic review and meta-analysis demonstrated a promising effect of e-health interventions to treat excess weight in children and adolescents.¹¹⁸ They found an overall significant reduction in BMI z-score (standardized mean difference = -0.31, 95% confidence interval -0.49 to -0.13) with sub-group analysis showing an even greater effect when looking at adolescents only (standardized mean difference = -0.633, 95% confidence interval -1.193 to -0.072). Although only high-quality Randomised Controlled Trials (RCTs) were included in the review, heterogeneity was high and more research is needed into effects of specific components and sustainability. A similar systematic review conducted in 2021 looking only at mobile app interventions in children and adolescents found mixed results on post-intervention weight loss with only three of the six included studies showing significant decrease in BMI z-score post intervention.¹¹⁹ However, they did note the apps' abilities to reach various demographics, ages and geographic locations. Additionally, research shows that smartphone usage for treating excess weight is associated with increased engagement and reduced intervention attrition rates.¹²⁰

A NICE evidence review conducted in children/adolescents and adults showed that feedback and monitoring, goal setting and social support were most highly associated

with changes in behaviour and that some level of individual tailoring was recommended for maximum effect.¹²¹ This aligns with research from service users who state they value self-monitoring, a sense of connectedness and the opportunity to learn remotely.¹²²⁻¹²⁴

Although evidence of adverse events associated with e-health interventions in adolescence is rare, they are also not well reported.¹²¹ In 2019 Weight Watchers (now WW) in the United States released a nutrition and weight loss app for children aged 8 - 17 years called Kurbo.¹²⁵ The app received an abundance of negative press for the potential harms it could cause to children and there were calls to stop promoting weight loss in children altogether.¹²⁶ Following the adverse press reporting, WW withdrew its plans to launch the app in the UK. NICE has since done an evidence review and states that while harms from digital interventions may be a possibility, they are not well reported and therefore there is no evidence to support or refute their use. They recommend Health Care Professional (HCP) involvement to monitor for unhealthy goals or signs of disordered eating.¹²¹

1.4. Evidence Gaps and Unanswered Questions

My review of the extant literature summarised here has shown that obesity in adolescence is both highly prevalent and rising, yet existing treatment models often fall short in terms of accessibility, practicality, and sustained effectiveness. Significant uncertainties remain regarding how best to support young people within this unique developmental stage, where physical, psychological, and social factors all shape engagement with weight management interventions. Addressing these gaps is essential to developing approaches that are both more effective and more acceptable to

adolescents and their families. This thesis seeks to contribute to this evidence base by examining several key areas, as outlined below:

How does setting impact effectiveness and accessibility of weight management interventions for adolescents?

The literature includes numerous examples of weight management interventions delivered either in schools or in community settings. However, there is a distinct lack of evidence directly comparing outcomes across the 2 settings using the same intervention. As a result, it is unknown whether particular settings offer advantages in terms of engagement, retention, or effectiveness, despite this being a key question for commissioners and providers seeking to optimise service delivery. In **Chapter 3**, I address this gap by evaluating the same real-world behavioural intervention delivered across both settings, allowing for a pragmatic comparison of effectiveness, attendance, and feasibility. **Chapter 4** builds on this by exploring adolescents' and parents' views on preferred modes of delivery, providing insight into how practical considerations, stigma, and personal preferences shape engagement.

Are adolescents concerned about their weight, and do they want support to manage it?

There is limited research that directly captures adolescents' own perspectives on weight and weight management, leaving considerable uncertainty about the extent to which young people are concerned about their weight, whether they wish to receive support, and what form such support should take. Yet this understanding is fundamental to determining how, or indeed whether, weight should be addressed in this age group. In **Chapter 4**, I explore these questions through qualitative interviews with

adolescents living with excess weight and with parents, generating an in-depth understanding of lived experiences, perceived needs, and preferences for support.

Chapter 5 builds on this by analysing population-level survey data to quantify the prevalence of weight concern in a general adolescent population and to assess the proportion of young people who express a desire for weight-related support. Together, these chapters provide both granular insight and broader epidemiological context to inform future service design.

Is a digital weight management intervention feasible, acceptable, and potentially effective for UK based adolescents?

Despite the inherent promise of mobile apps to treat excess weight in adolescence, there is a distinct lack of UK-based evidence with most of the current studies being done in the United States.¹²⁷ There is also a lack of literature looking at mobile apps in adolescents without parental support. In **Chapter 6** I conduct a feasibility study to look at the use of mobile app to support weight loss in adolescents with excess weight.

CHAPTER 2: AIMS, OBJECTIVES AND METHODS

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

2.1. Summary

This chapter outlines the aims, objectives, and methodological foundations of this thesis. It begins by presenting the overall aim of the research programme and the specific objectives that guided each stage of the work, together with an overview of the methods used to address them. The chapter then describes the philosophical positioning underpinning the research, including the ontological and epistemological assumptions that informed the study design and interpretation of findings. Finally, it considers the role of reflexivity and positionality throughout the research process, reflecting on how my professional background, personal experiences, and assumptions may have shaped the conduct and interpretation of the research.

2.2. Thesis Aim and Objectives

2.2.1. Thesis Aim

The overarching aim of this thesis is to investigate how we can better support adolescents to achieve and maintain a healthy weight. This is done by exploring existing interventions, developing a better understanding of adolescent preference and needs,

and evaluating a new intervention for feasibility. Throughout this thesis, I aim to contribute to the evidence base in this under-researched population.

2.2.2. Thesis objectives

The objectives of this thesis are as follows:

1. To assess the effectiveness of an existing real world behavioural weight management intervention, Healthy Eagles, with a particular focus on whether the setting of delivery, school or community, influences intervention outcomes.
2. To better understand how young people and parents feel about weight and weight management in order to determine better means of support.
3. To assess the prevalence of weight and shape concern and desire for weight management support among UK based adolescents.
4. To assess the feasibility of using a remote, digital intervention to support adolescents to manage their weight.

2.3. Overview of the Research Programme

To address these objectives, a mixed-methods programme of research was undertaken.

First, I evaluated an existing adolescent weight management intervention, Healthy Eagles, to examine overall effectiveness and explore whether outcomes differed between school and community delivery settings. Second, I conducted semi-structured interviews with 16 adolescents who self-identified as being above a healthy weight and 10 parents of adolescents who self-identified as being above a healthy weight. The interviews were transcribed verbatim and analysed using reflexive thematic analysis to explore views and experiences relating to weight and weight management. Third, I analysed data from a large school-based survey to examine the prevalence of weight

concern and desire for weight support among adolescents, and to explore the relationship between these constructs. Finally, I conducted a mixed-methods feasibility trial of a digital weight management intervention to assess the feasibility, acceptability, and potential effectiveness of a future definitive randomised controlled trial.

Collectively, these studies provide complementary perspectives on adolescent weight management, spanning intervention evaluation, qualitative exploration, population-level analysis, and feasibility testing of a novel intervention.

Table 2.1: Overview of the research programme

Objective	Study	Design	Chapter
1	Healthy Eagles evaluation	Secondary analysis / intervention evaluation	Chapter 3
2	Adolescent and parent interviews	Qualitative study	Chapter 4
3	OxWell survey analysis	Cross-sectional quantitative study	Chapter 5
4	Digital intervention feasibility trial	Mixed-methods feasibility trial	Chapter 6

2.4. Philosophical positioning

When conducting research, it is important to consider the philosophical assumptions that underpin the research process, as these assumptions influence how the social world is understood, how knowledge is generated, and how findings are interpreted.¹²⁸

An understanding of ontology and epistemology provides a foundation for methodological decision-making and helps ensure coherence between the research question, methods, analysis, and interpretation of findings.^{128,129}

2.4.1. Ontology and epistemology

Within this thesis, weight-related phenomena are conceptualised as containing both objective and subjective elements. Whilst excess weight can be measured objectively using anthropometric indicators, many of the issues explored within the research, including weight concern, body image, stigma, help-seeking, and perceptions of support, are experienced and interpreted differently by different individuals. For example, two adolescents with the same body weight may have very different levels of weight concern, different motivations for seeking support, and different interpretations of their experiences. Consequently, this research adopts a position that recognises both the existence of measurable weight-related phenomena and the importance of understanding how these phenomena are experienced within social, cultural, and familial contexts. Although the qualitative component of the thesis is situated towards the interpretivist end of the ontological continuum, the overall programme of research is positioned within a subtle realist framework, which acknowledges that a reality exists independently of the researcher whilst recognising that access to that reality is mediated through human experience and interpretation.¹²⁸

Consistent with a subtle realist position, this thesis does not assume that researchers can directly access an objective reality. Rather, knowledge is generated through the interaction between participants, researchers, and the research process itself.¹²⁸

Participants provide accounts of their experiences, but these accounts are shaped by

memory, context, language, and social influences. Similarly, the interpretation of those accounts is influenced by the researcher's own experiences, assumptions, professional background, and theoretical perspective. Consequently, no single method is assumed to provide direct access to truth; instead, different methods offer different forms of insight into the phenomenon under investigation.

The adoption of a subtle realist position informed the mixed-methods design of this thesis. Qualitative interviews are used to explore how adolescents and parents experience, interpret, and construct meaning around weight, weight concern, and weight management. Quantitative approaches are used to examine measurable aspects of these phenomena, including intervention outcomes, prevalence estimates, and associations between weight concern and support-seeking behaviours.

Collectively, these approaches seek to develop a more comprehensive understanding of adolescent weight management by examining both observable outcomes and the ways in which those outcomes are experienced and understood by young people and their families.

2.4.2. Reflexivity and Positionality

If knowledge is co-constructed between researcher and participant, then it is important to consider my own role in that process. Reflexivity and positionality recognise that researchers are not neutral observers but bring their own experiences, values, assumptions, and professional backgrounds to every stage of the research process.^{130,131} Positionality refers to the social, professional, and personal characteristics of the researcher and how these may influence interactions with participants, methodological decisions, data interpretation, and the knowledge that is

ultimately produced.¹³² Reflexivity involves the ongoing process of critically examining these influences and considering how they shape the research process and findings.¹³¹

Consistent with the subtle realist position adopted within this thesis, I acknowledge that my professional background, previous experiences, and personal assumptions influenced the questions I asked, the methods I selected, the relationships I developed with participants, and the interpretation of the data. Reflecting on these influences and considering how they shape decision-making throughout the research process is therefore an important component of establishing the credibility and trustworthiness of the research presented in this thesis.^{128,131}

2.4.2.1. Professional Background and Prior Assumptions

As a Registered Paediatric Dietitian with over 15 years of experience working in childhood obesity and weight management, I entered this research with pre-existing professional knowledge, assumptions, and perspectives that inevitably influenced how I approached the research process.

My prior involvement with the Healthy Eagles programme is particularly relevant in this regard. I was part of the team that designed the intervention and, although I was not involved in delivering the programme directly, I provided training and support to the practitioners who did. This prior involvement provided valuable contextual knowledge of the intervention and its implementation, but also meant that I entered the evaluation with existing views regarding its potential value. For example, my decision to examine differences between school- and community-based delivery was informed by a belief that schools may provide a supportive and accessible environment for adolescent weight management. Recognising this position from the outset enabled me to remain

attentive to alternative interpretations of the findings and to critically examine how my prior experiences may have shaped both the questions asked and the conclusions drawn.

Having spent much of my clinical and academic career working within obesity and weight management services, I recognise that I entered this research with a tendency to view weight-related issues primarily through the lens of objective weight status and associated health risks. My professional training has largely focused on identifying and managing excess weight, which may predispose me to interpret discussions of weight, body shape, and support needs within a weight management framework. It was important for me to acknowledge these assumptions from the outset, and consistently challenge my interpretation of the data to question whether I was picking up on alternatives viewpoints to an objective weight narrative.

Throughout my clinical career, I have delivered training programmes aimed at increasing healthcare professionals' confidence in raising the issue of weight with children, young people, and their families. These programmes were informed by initiatives such as Making Every Contact Count and were underpinned by the assumption that healthcare professionals were well placed to identify weight-related concerns and initiate conversations about weight whenever opportunities arose.¹³³ Consequently, I entered this doctorate with the belief that increasing the frequency and quality of weight-related conversations within healthcare settings would be both beneficial and broadly welcomed. Throughout the research process, I therefore aimed to remain mindful of how this assumption might influence my interpretation of the data and to remain open

to perspectives that challenged the acceptability or value of healthcare professional-led approaches to weight management.

2.4.2.2. My position within the research

During the qualitative interviews, participants were aware that I was a dietitian undertaking research into adolescent weight management. Whilst I was never explicit about my clinical experience in facilitating weight management interventions this may have been apparent by my first-hand knowledge in the subject area. This may have influenced what participants chose to disclose and how they presented their experiences. Some adolescents may have viewed me as an authority figure or as someone who supported traditional weight management approaches, potentially making them less willing to express views that challenged these approaches. Conversely, my clinical background may also have facilitated rapport, as participants may have perceived me as someone who was knowledgeable about weight-related issues and therefore able to understand their experiences.

The interviews also involved an adult researcher, myself, interviewing adolescents, creating an inherent power imbalance that may inhibit young people from speaking up. Although I presented myself as a DPhil student, it was likely that the age gap, meant they were still unable to see me as one of their peers. To minimise this, I adopted a conversational interviewing style and emphasised that there were no right or wrong answers. Nevertheless, I recognise that participants may still have tailored their responses based on what they perceived I wanted to hear or what they felt was socially acceptable. Additionally, my position as an adult researcher may have influenced how I interpreted adolescents' accounts and prioritised particular explanations within the

data. Although I sought to centre young people's perspectives throughout the analysis, aspects of contemporary adolescent life may differ substantially from my own experiences and assumptions. This required ongoing reflection to ensure that participants' interpretations remained central to the analysis and that alternative explanations were considered alongside my own perspectives.

In addition to my professional identity, other aspects of my personal background may also have influenced the research process. As a mother of two children, I brought personal experience of navigating conversations about food, health, body image, and wellbeing with young people. This may have facilitated rapport with parent participants, particularly mothers, as I was able to understand many of the practical challenges and emotional complexities associated with supporting children's health. It is also possible that my identity as a mother influenced patterns of participation within the study.

Although fathers were eligible to participate, all parent interview participants were mothers. It is therefore possible that some parents perceived a greater sense of shared experience or identification with me as the interviewer.

My identity as a white British woman may also have influenced both the conduct and interpretation of the research. Many of the issues discussed by participants, including body image, societal appearance standards and weight concern are issues that disproportionately affect women and girls. As a woman living within the same broader social context, I was not entirely separate from the cultural messages and expectations being described by participants. However, many of these issues are culturally specific as well, and it is possible that I was unable to grasp some of the cultural nuance expressed by participants from ethnic minority backgrounds or that they may have seen

me as an outsider to their lived experience. This may have enhanced my ability to empathise with participants' accounts, but it also required ongoing reflection to ensure that my own experiences and assumptions did not lead me to over-identify with particular narratives or interpretations.

It is also important to acknowledge that I currently have, and have always had, a body weight that falls within the healthy weight range. Whilst I have been exposed to many of the same societal pressures and appearance ideals experienced by women in Western societies, I have not personally experienced living in a body that would be classified as above a healthy weight. Although participants were not aware of my body size, as all interviews were conducted without video, this aspect of my identity may nevertheless have influenced my interpretation of the data. On one hand, it is possible that I was less able to fully appreciate some of the lived experiences associated with weight stigma, body image concerns, and navigating life in a larger body. On the other hand, my relative distance from these experiences may have enabled me to approach participants' accounts with greater curiosity and fewer assumptions based on personal experience. Reflecting on this tension reinforced the importance of grounding interpretations within participants' accounts rather than relying on my own understanding of weight-related experiences.

2.4.2.3. Evolving understanding throughout the research process

Reflexivity was undertaken as an ongoing process throughout data collection, analysis, and interpretation, involving critical reflection on how my positionality influenced interactions with participants, analytic decisions, and the development of findings. Interpretations were discussed with supervisors from different disciplinary

backgrounds, providing opportunities to challenge assumptions, consider alternative explanations, and examine how my own experiences may have shaped the conclusions drawn. Rather than attempting to eliminate these influences, I sought to engage with them critically and transparently, recognising that knowledge is co-constructed through the interaction between researcher, participant, and context.

One of the most significant shifts in my thinking throughout this doctorate related to the relationship between weight status and weight concern. At the outset of the research, my professional training and clinical experience had largely focused on excess weight as the primary issue requiring intervention. Consequently, I initially viewed weight concern as largely a consequence of excess weight and assumed that objective measures of body weight would be central to understanding adolescents' experiences. However, findings from across the research programme increasingly challenged this assumption. Adolescents with similar body weights often reported markedly different levels of weight concern, support needs, and psychological distress, whilst some young people with a healthy weight described substantial concern about their weight or shape. This highlighted that objective weight status alone was insufficient to explain adolescents' experiences and prompted me to view weight concern as a distinct phenomenon that may warrant attention in its own right.

More broadly, the research led me to recognise that understanding adolescent weight management requires consideration not only of measurable weight-related outcomes, but also of how young people and their families interpret, negotiate, and construct meaning around weight within their social, cultural, and familial environments. These reflections reinforced my alignment with a subtle realist position, which acknowledges

both the existence of measurable phenomena and the importance of understanding how those phenomena are experienced and interpreted by different individuals. As a result, my understanding of adolescent weight management evolved from a predominantly weight-focused perspective towards a broader appreciation of the social, psychological, and emotional dimensions of weight-related experiences.

2.5. Conclusion

This chapter has outlined the aims and objectives of the thesis and provided an overview of the mixed-methods programme of research undertaken to address them. It has also described the philosophical positioning underpinning the research, which was informed by a subtle realist perspective that recognised both the existence of measurable weight-related phenomena and the importance of understanding how these phenomena are experienced and interpreted by adolescents and their families.

Finally, the chapter has considered the influence of my own positionality and reflexive practice throughout the research process. As a paediatric dietitian, researcher, mother, and woman, I brought a range of experiences, assumptions, and perspectives to the research that shaped the questions asked, methods selected, and interpretations developed. By critically reflecting on these influences, I sought to ensure that the research remained grounded in participants' accounts whilst acknowledging the role of the researcher in the co-construction of knowledge. The following chapters present the findings from each stage of the research programme and collectively contribute to a more nuanced understanding of how adolescents can be better supported to achieve and maintain a healthy weight.

CHAPTER 3: EVALUATION OF A REAL-WORLD COMPLEX INTERVENTION TO MANAGE EXCESS WEIGHT IN ADOLESCENTS

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

3.1. Summary

The aim of this chapter is to analyse data from an existing childhood weight management programme run in both school and community settings, to understand both overall effectiveness and the difference in effectiveness between each setting.

Healthy Eagles is a children's BWMI run in the London borough of Croydon in both school and community settings. The programme aims to treat childhood obesity by increasing positive health behaviours leading to maintenance or reduction of body mass index (BMI) z-score in children aged 4-16 years. I ran a secondary analysis of the Healthy Eagles participant data from 2017 – 2020 to look for overall programme effectiveness, based on changes in BMI z-score and health behaviours, and any differences between the two settings. I also assessed whether the programme had any negative impact on healthy weight participants.

A total of 1087 participants completed the Healthy Eagles programme between Sept 2017 and June 2020; of these, 535 participants (49%) were deemed eligible for the analysis. Overall, there was no evidence of an effect of the intervention on BMI z-score for participants above a healthy weight. Analysis of the two settings showed that

participants above a healthy weight in the school setting significantly decreased BMI z-score however, the community setting showed no significant changes, with BMI z-score trending upwards. There was no significant change in participants identified as a healthy weight. There was little evidence of change in health behaviours.

This evaluation shows a small but significant benefit to running interventions in a school setting. However, neither setting demonstrated substantial improvements in health or BMI z-score overall. This suggests that further work may be needed to refine intervention content and delivery to support meaningful outcomes.

Note: A paper based on this study has been published as follows:

- Little, Melissa, et al. "A Natural Experiment Comparing the Effectiveness of the “Healthy Eagles” Child Weight Management Intervention in School Versus Community Settings." *Nutrients* 13.11 (2021): 3912.

3.2. Introduction

In Chapter 1, I described how NICE guidance recommend family-based behavioural weight management interventions (BWMI) to treat excess weight in children.¹ These are 10-12-week family-based interventions typically run in a community setting and incorporating nutrition, physical activity and behaviour change advice. NICE suggests that interventions should target only children above a healthy weight and that participants should attend at least once per week for a minimum of one hour. However, the evidence to support these interventions is limited and, in most cases, is generated under trial conditions in white, middle-class populations.^{72,134} As obesity is a condition that disproportionately affects minority ethnic and deprived populations,⁹ the evidence does not currently reflect those most at risk. Interventions developed from incomplete evidence may be less accessible, less effective, or less culturally relevant for those at greatest risk and, as a result, policies and services may become misaligned with the needs of the populations most affected by obesity.

Healthy Eagles is a BWMI that aims to treat excess weight in children by increasing positive health behaviours leading to maintenance or reduction of BMI z-score in children aged 4-16 years. Based on the current NICE guidelines for programme content, Healthy Eagles offers participants a 10-week programme covering various health-promoting topics such as food groups and portion sizes, physical activity and mindful eating, and incorporates behaviour change techniques to encourage adoption.¹ I was previously responsible for the development of Healthy Eagles which was delivered in the London Borough of Croydon from 2017 to 2020. It ran in two forms, either in

community venues and included only children above a healthy weight or in secondary schools, including all children regardless of weight status.

The prevalence of pupils who are living with overweight or obesity aged 10-11 years in the London Borough of Croydon is 38% compared with 36% for England as a whole.⁹ Additionally, 52% of Croydon residents come from ethnic minority backgrounds, and the child poverty rate in Croydon is higher than the national average with 25% of Croydon children eligible for free school meals compared to the national average of 20%.¹³⁵ Both socioeconomic deprivation and belonging to an ethnic minority group are associated with a higher prevalence of overweight.⁹ Uptake and adherence to obesity treatment programmes and participation in obesity treatment trials for children are lower in these communities, resulting in a paucity of evidence on effective weight management interventions in this high-risk group.^{134,136,137} Barriers to engagement often include structural challenges such as cost, transport, and childcare, as well as social barriers like stigma and a lack of culturally tailored support.¹³⁴

There is limited evidence of the effectiveness of these types of programmes to change health-related behaviours or to manage excess weight in children when implemented in real-world settings. By running the intervention in both the school and the community, it is possible to assess the intervention's overall effect and consider the effectiveness in each setting. Additionally, because the school-based programme was also run with healthy weight participants, it was possible to evaluate the programme's impact in children with a healthy weight at baseline to look for any evidence of harm caused by attention to weight-related issues.

The objectives of this evaluation are:

1. To assess the change in BMI z-score of children who attended the Healthy Eagles child weight management programme.
2. To examine changes in health-related behaviours during the intervention.
3. To compare the change in BMI z-score of children above a healthy weight in school-based interventions with those in community-based interventions.
4. To examine the impact of the programme on BMI z-scores in children with a healthy weight.

3.3. Methods

3.3.1. Study design

This was a secondary analysis of a child weight management intervention delivered in two different settings; secondary schools and community venues. Data were collected from participants attending the Healthy Eagles programme between December 2017 and June 2020. Ethical review and approval were waived for this study, as it was a secondary evaluation of an existing programme.

3.3.2. Participants

Children were eligible for the programme if they were aged 4-16 years and either living in the London Borough of Croydon or attending a school in the borough.

The community programmes' eligibility criteria were BMI greater than 91st Centile (BMI z-score >1.34 SDs), considered above a healthy weight in the WHO - Growth Reference Charts. Participants were recruited through the National Child Measurement Programme (NCMP) or referred by GPs, health care professionals or their school. Participants could also self-refer.

The in-school programmes targeted secondary schools in areas with high levels of deprivation and obesity, based on the NCMP results and deprivations maps. Letters were sent to parents informing them of the programme and asking them to contact the Healthy Eagles team if they had questions; nobody made contact. In most schools, the Healthy Eagles programme was delivered as part of a Personal Social and Health Education (PSHE) lesson or a Physical Education (PE) lesson and often, it was delivered to students who refused to engage in standard PE provision. For all school-based programmes, schools decided which classes and year groups would participate. There was no BMI requirement to attend the in-school programmes; thus, they included participants of any BMI z-score. Programmes lasted for three months and comprised between 7 and 10 sessions.

3.3.3. Intervention

Healthy Eagles is a 10-week child weight management intervention designed to maintain or reduce BMI z-scores in children above a healthy weight and improve positive health behaviours in all participants. The intervention was designed and developed by Foodtalk, a dietitian led Community Interest Company with over a decade of experience in the field, based on NICE guidance and on emerging and promising research in the area. The Palace for Life Foundation (PFL), the charitable arm of Crystal Palace Football Club, a Premier League Football team, led on the delivery. Crystal Palace Football Club is a stalwart of the Croydon Community and has an immediate name and brand recognition throughout the borough and an extensive social media following, especially amongst the younger Croydon generation. PFL also ran other community programmes in Croydon, including youth mental health work, programmes to reduce gang violence and knife crime, and extra-curricular work within schools. By

combining Foodtalk's expertise in child weight management with the ground level, borough-wide knowledge of PFL, an intervention was created based on evidence and bespoke to the needs of the Croydon community.

Healthy Eagles was delivered by health coaches, most with a physical activity or nutrition background, who were hired and managed by PFL. Coaches received intensive two-day training delivered by Foodtalk dietitians and a comprehensive programme delivery manual outlining key topics, background reading, and a step-by-step guide to each session. For quality assurance, each coach was supervised during delivery once per term, and a WhatsApp group was set up to provide continuous ongoing support to coaches. As recommended by the Medical Research Council, an extensive process evaluation was undertaken during the second year of the programme to ensure programme fidelity and determine any key barriers and facilitators to fidelity maintenance.¹³⁸ This was done through structured observations, focus groups with coaches, self-reported participant questionnaires and an audit of participant attrition. The process evaluation found that whilst most programmes were delivered with contextual or content modifications, this did not significantly impact participant learning outcomes. Additionally, by identifying key barriers to fidelity, the team could address these and make improvements.

The intervention itself consisted of ten weekly sessions ranging from 1-1.5hrs each. Each session covered a different topic such as portion sizes, grocery shopping or physical activity delivered through active games, challenges and self-reflection. Core components based on behaviour change were repeated each week and included goal

setting and reflection, food tasting and mindfulness. Participants were also given a guided journal and asked to fill this in weekly to support their learning at home.

The Healthy Eagles programme is underpinned by the Social Cognitive Theory of Behaviour Change which states that our environmental, personal and behavioural factors all work together to predict behavioural outcomes.¹³⁹ The theory's key underlying concepts used in the Healthy Eagles programme were self-efficacy, reinforcement, behavioural capability, and observational learning. To improve self-efficacy and behavioural capabilities, participants were provided with the skills and knowledge to achieve their goals and positive reinforcement was used to celebrate achievements. Goals and rewards were self-led, allowing participants to define both outcomes and expectations of the programme. Observational learning was practised by allowing participants to observe both the coaches and their peers and engage in health behaviour modelling of nutrition and physical activity behaviours.

Healthy Eagles was initially designed to be delivered in community settings. However, later this was adjusted to include delivery in schools, although the content remained unchanged. The community programme was developed based on a "rolling, drop-in" design, meaning that families could start immediately after referral instead of waiting for an appropriate programme to begin. This offered flexibility for families unable to attend every week and had the added benefit of allowing participants who were just starting their journey to learn from those further along in the programme creating a peer-to-peer mentoring model. Additionally, as the programme continued even after participants "graduated", they could drop back in at any point if they felt they needed extra support. When delivered in schools, the programme reverted to concurrent

weekly sessions. As attendance was mandatory and during school hours, it was unnecessary to provide a flexible model.

Referral to the Healthy Eagles programme was through the NCMP, referral from a school or health professional or self-referral. This was accompanied by extensive Healthy Weight Awareness training throughout the borough with 550 school, health and voluntary staff receiving training on raising the issue of weight with families and how to refer into the programme. Working with the broader community of health and care professionals aimed to increase awareness of the complexity of obesity, challenge the stigma surrounding obesity and improve the way the issue of weight was raised with families. Helping families recognise that their weight may be an issue in a supportive and non-judgemental way allowed families to take the first step towards seeking treatment and subsequent changes in behaviour without feeling demonised or shamed.

3.3.4. Outcomes measures

The primary outcome was a change in BMI z-score from baseline to post-intervention. Weight and height measurements were taken at the beginning and end of the intervention by programme delivery staff after comprehensive training and following guidelines for the National Child Measurement Programme.¹² Measurements were taken without shoes in light clothing and recorded to the nearest 0.1cm. Raw data of height, weight, date of birth (DOB) and date of measurements (at baseline and post-intervention) were used to calculate BMI of children and converted to BMI z-scores based on the WHO-Growth Charts using LMS Growth Software (Pan & Cole).⁴ BMI z-scores allow for a single measure relevant across gender and age and over time.¹

The secondary outcomes were changes in six health behaviours chosen due to evidence of impact on weight in children and because they were targeted within the programme.¹ These were consumption of vegetables, consumption of sweet and/or savoury snacks, physical activity levels, sedentary behaviour, eating together as a family, and eating in front of the television. Assessment questions and answers are outlined in **Table 3.1**.

Demographic data, including participant age, gender, ethnicity and post-code, were also collected at the first point of contact. Postcode was used to evaluate deprivation decile based on the English Indices for Multiple Deprivation 2019.

Table 3.1: Health Behaviours assessment questionnaire for the Healthy Eagles intervention

Health Behaviour	Question	Potential Answers
Vegetable Consumption	On most days, when do you eat the following:	A) Breakfast B) Lunch C) Dinner
Snack Consumption	Sweet snacks? savoury snacks? Vegetables? Tick all that apply	D) Snacks- morning or afternoon E) Before bed
Physical Activity	How much physical activity do you currently do per week?	Each day of the week was listed and had a tick box with the following: <1hr, 1-2hrs, 3-4hrs, 5-6hrs, 7-8hrs, 8+hrs
Sedentary Behaviours	How long do you spend doing the following each day: Watching television? Playing video games?	Broken down to weekdays and weekend with the following options: <1hr, 1-2hrs, 3-4hrs, 5-6hrs, 7-8hrs, 8+hrs
Eating together as a family	On most days when does your family do the	A) breakfast, B) Lunch (weekends),

Eating in front of the television	following: family meal time with whoever is in the house at the time of the meal? TV on during mealtime? Tick all that apply	C) Dinner, D) snacks – morning or afternoon E) Before bed
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3.3.5. Analysis

3.3.5.1. Data cleaning

Participants were excluded if BMI z-score was not available both pre- and post-intervention. Data were checked for plausibility, and highly improbable measures were removed from the analysis.

Data were only analysed for participants who attended at least seven of the ten programme sessions and had complete pre- and post-intervention data. Data were not analysed on an intent-to-treat basis because adherence differed considerably between the school and community programme, with the school taking an opt-out rather than opt-in approach.¹⁴⁰

3.3.5.2. Primary outcome

The analysis used data from all eligible participants in both school and community settings with complete data on BMI z-score. A paired t-test was done on BMI Z-score using pre- and post-intervention measures.

Subsequently, participants were divided into groups based on programme setting (school and community) and baseline BMI z-score. The following z-score cut-offs were

used to define weight categories based on the British 1990/WHO-Growth Chart cut-offs for BMI.⁴

- i. Healthy weight (z-score -1.34 to 1.34)
- ii. overweight (z-score 1.34 to 2.05)
- iii. obese (z-score 2.05 to 2.65)
- iv. severely obese (z-score >2.65)

Multiple linear regression was used to compare outcomes between the school-based and community-based intervention with the community-based intervention as the reference. This analysis was restricted to children above a healthy weight as the community programme did not include healthy weight participants. The analysis was adjusted for differences in socioeconomic status, age, gender, and ethnic group.

Among participants above a healthy weight, I conducted subgroup analysis for groups defined by gender, ethnicity, age and deprivation using a paired t-test calculation.

Ethnicity was divided into four sub-categories: white (British/Irish/Other), black (African/Caribbean/Other), Asian and any other ethnic background. Age was divided into older and equal to, or younger than, eleven years. Gender was divided into girls and boys, and deprivation was sub-categorised into the two least deprived and the two most deprived centiles based on individual postcode.

3.3.5.3. Secondary outcomes

This analysis was based on changes measured in questionnaires completed at baseline and end of the programme. For physical activity and sedentary behaviour, hours per day were rounded to the highest whole hour (i.e. 1-2 hours was rounded to 2 hours) and calculated to give a total number of weekly hours. Dietary intake and mealtime

behaviours were converted to numeric scores where 0=never and 5=at every meal and snack. Scores were analysed using a paired t-test calculation with baseline and post-intervention data.

All calculations were done using SPSS for IBM Version 27 and I took an estimation approach rather than confirmatory, with confidence intervals set at 95%.

3.4. Results

3.4.1. Participants

A total of 1087 participants completed the Healthy Eagles programme between September 2017 and June 2020. Of these, 535 participants (49%) were deemed eligible for the analysis as while most participants had some data, many lacked all the data needed to calculate both pre- and post-intervention BMI z-score, including gender, date of birth, height (pre/post), weight (pre/post) and date of pre and post measurements.

See **Figure 3.1** for participant breakdown.

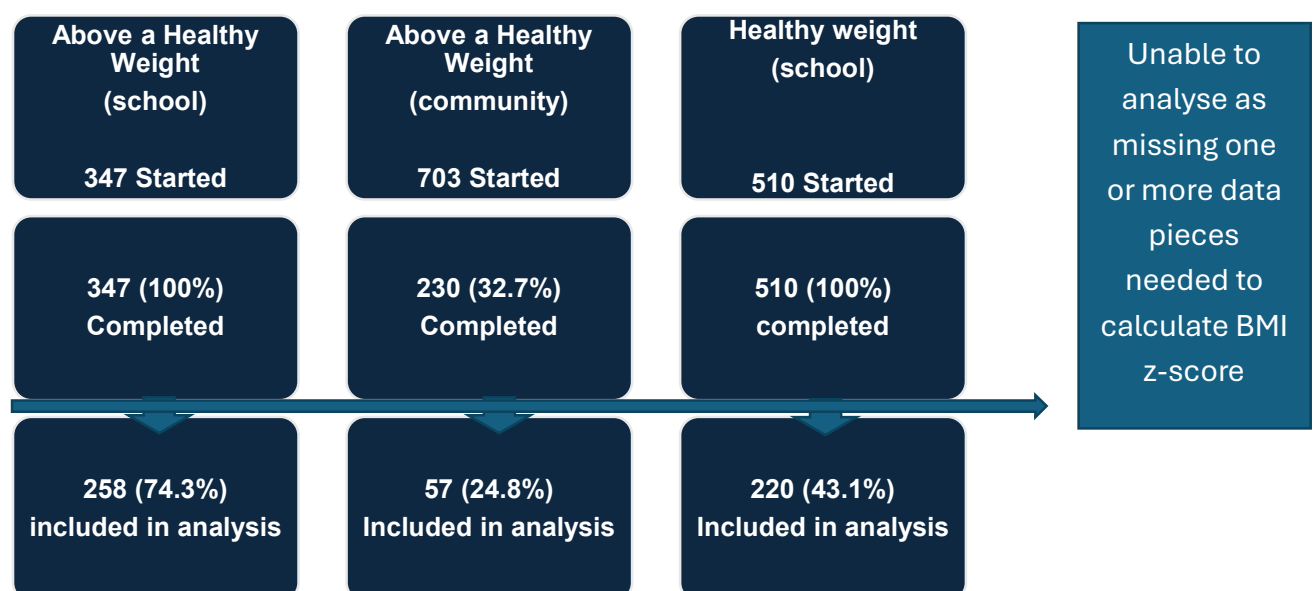


Figure 3.1: Participant flowchart

Whilst 100% of the school-based participants completed the intervention, only 32.7% of the community-based participants did. Only 74.3% (school), 24.8% (community) of participants above a healthy weight could be included in the analysis and 43.1% of the healthy weight participants. This was due to lack of complete data sets needed to calculate BMI z-score.

Table 3.2 shows the participant demographic characteristics. Two children who were underweight were excluded from the study as the sample size was too small to give meaningful results.

Table 3.2: Participant characteristics at baseline

	Total	School					Community			
		All	Healthy Weight	Over weight	Obesity	Severe Obesity	All	Over weight	Obesity	Severe Obesity
Baseline BMI z-score Mean (SD)		1.3 (1.41)	0.1 (1.05)	1.71 (0.21)	2.32 (0.17)	3.32 (0.81)	2.44 (0.68)	1.68 (0.18)	2.31 (0.18)	3.11 (0.46)
n	535	478	220	116	65	77	57	17	17	23
Gender n(%)										
Girl	323 (62)	322 (67)	160 (73)	78 (67)	41 (63)	43 (56)	31 (54)	13 (76)	7 (41)	11 (48)
Boy	201 (38)	156 (33)	60 (27)	38 (33)	24 (27)	34 (44)	26 (46)	4 (24)	10 (59)	12 (52)
Ethnicity n(%)										
Black(African/Carribean / Other)	231 (48)	225 (47)	119 (54)	48 (41)	33(51)	25 (32)	30 (53)	10 (59)	10 (59)	10 (43)
White (British/ Irish/Other)	70 (14.6)	64 (13)	26 (12)	16(14)	9 (14)	13 (17)	8 (14)	2 (12)	2 (12)	4 (17)
Asian (British/ Welsh/Other)	80 (16.6)	91 (19)	40 (18)	28 (24)	10 (15)	13 (17)	9 (16)	3 (18)	3 (18)	3 (13)
Mixed	22 (4.6)	46 (10)	9 (4.1)	18 (16)	7 (11)	12 (16)	9 (16)	2 (12)	2 (12)	5 (22)
Unknown	78 (16.2)	52 (11)	26 (12)	6 (5)	6 (9)	14 (18)	1 (2)	0	0	1 (4)
Deprivation Decile* Mean(SD);	3.72 (1.08)	3.66 (1.11)	3.62 (1.08)	3.51 (1.26)	3.68 (1.09)	3.94 (0.99)	4.05 (0.77)	3.88 (0.72)	4.13 (0.96)	4.17 (0.65)

unknown										
Age	11.7	12.04	12.42	12.16	11.91	11.04	10.6	11.18	10.71	10.46
Mean (SD)	(2.07)	(1.83)	(1.38)	(1.97)	(1.50)	(2.28)	(2.60)	(3.21)	(1.79)	(2.54)

* 1 is most deprived, 10 most affluent

3.4.2. Programme effectiveness

Overall, there was no evidence of a difference in BMI z-score for participants above a healthy weight from baseline (M=2.36) to post-intervention (M=2.33) (mean difference = -0.03, 95% CI= 0.00, -0.06).

Table 3.3 shows a subgroup analysis of all participants above a healthy weight based on ethnicity, age, gender and deprivation. There was a significant reduction in BMI z-score for Black (African/Caribbean/other) ethnicity, children older than eleven and those from the most deprived two centiles.

Table 3.3: Subgroup analysis of change in BMI z-score for participants above a healthy weight

	N	Change in BMI z-score
All participants above a healthy weight	315	
White (British/Irish/Other)	46	0.03 (-0.10, 0.15)
Black (African/Caribbean/other)*	136	-0.06 (-0.09, -0.02)
Asian	49	-0.00 (-0.08, 0.08)
Any other ethnic background	45	-0.06 (-0.17, 0.05)
≤11	89	0.01 (-0.08, 0.09)
>11*	124	-0.10 (-0.14, -0.06)
Girl	193	-0.02 (-0.06, 0.01)
Boy	121	-0.05 (-0.12, 0.01)
Most deprived 2 centiles*	121	-0.06 (-0.11, -0.01)
Least deprived 2 centiles	33	-0.10 (-0.25, 0.04)

*indicated P-value of <0.05

3.4.3. Effects of setting on BMI z-score in children above a healthy weight

There was a significant reduction in BMI z-score for school participants above a healthy weight ($M=-0.04$, 95% CI= -0.08 , -0.01) with the greatest reduction in children identified as living with severe obesity, where the decrease was also statistically significant ($M=-0.09$, 95% CI= -0.15 , -0.03). School participants in the overweight and obese categories also showed reductions in BMI z-score; however, the changes in these categories alone were not significant.

In the community programmes, the sample size was much smaller, and there was no significant change in BMI z-score for the group as a whole or in any subgroups. Indeed, the trend was towards an increase (**Table 3.4**).

Table 3.4: Change in BMI z-score pre- and post-intervention by setting and baseline BMI z-score

	N	Change in BMI z-score
All participants above a healthy weight	315	-0.03 (-0.64 to 0.01)
All healthy weight participants	220	0.03 (-0.03 to 0.09)
School Setting		
All participants above a healthy weight*	258	-0.04 (-0.08 to -0.01)
Only participants who are living with overweight	115	-0.01 (-0.07 to 0.05)
Only participants who are living with obesity	66	-0.05 (-0.13 to 0.03)
Only participants who are living with severe obesity*	77	-0.09 (-0.15 to -0.03)
Community Setting		

All participants above a healthy weight	57	0.03 (-0.06 to 0.12)
Only participants who are living with overweight	17	-0.09 (-0.26 to 0.09)
Only participants who are living with obesity	17	0.14 (-0.11 to 0.39)
Only participants who are living with severe obesity	23	0.03 (-0.03 to 0.10)

*Indicates P-value of <0.05

Linear regression analysis showed that school setting was associated with a 0.24 (95% CI: 0.10, 0.44) greater reduction unadjusted, and 0.26 (95%CI: 0.13, 0.49) adjusted for ethnicity, deprivation, age and gender.

3.4.4. Secondary outcomes

In general, there was no evidence of any significant change in health behaviours regardless of baseline BMI z-score or setting (**Table 3.5**). The exception to this was in the community programme where physical activity levels and eating in front of the television both showed significant decreases.

Table 3.5: Mean change in health behaviours from pre to post intervention

	N	Mean Change (Pre/post-intervention) (95%CI)
Above a healthy Weight (school)		
Eating Vegetables	103	0.18 (-.03 to .38)
Eating Sweet and/or Savoury Snacks	81	-0.24 (-.60 to .13)
Physical Activity	120	0.46 (-1.10 to 2.01)
Sedentary Behaviour	123	0.48 (-.07 to 1.03)
Eating together as a family	105	0.04 (-.14 to .22)
Eating in front of the TV	166	-0.07 (-.38 to .24)

Above a healthy Weight (community)		
Eating Vegetables	28	0.32 (-.29 to .93)
Eating Sweet and/or Savoury Snacks	18	0.50 (-.71 to 1.71)
Physical activity*	42	-3.26 (-6.41 to -.11)
Sedentary Behaviour	36	0.08 (-.91 to 1.07)
Eating together as a family	29	-0.45 (-.96 to .07)
Eating in front of the TV*	26	-0.85 (-1.58 to -.14)
Healthy Weight		
Eating Vegetables	174	0.07 (-.07 to .21)
Eating Sweet and/or Savoury Snacks	153	0.17 (-.06 to .40)
Physical activity*	180	-2.16 (-3.07 to -1.26)
Sedentary Behaviour	170	-0.12 (-.54 to .30)
Eating together as a family	187	0.05 (-.12 to .22)
Eating in front of the TV	166	0.06 (-.13 to .25)

*Indicates P-value of <0.05

3.5. Discussion

3.5.1. Principal findings

This secondary analysis aimed to assess the overall effectiveness of a behavioural weight management intervention (Healthy Eagles) to treat excess weight in children. The intervention showed no overall significant difference in BMI z-score for participants above a healthy weight from pre- to post-intervention. Results from a subgroup analysis showed a significant reduction in BMI z-score for participants of Black (African/Caribbean/other) ethnicity, those over the age of eleven and those from the most deprived 2 centiles; all other subgroups showed no significant change. Analysis of the two settings showed that participants above a healthy weight in the school setting significantly decreased BMI z-score however, the community setting showed no significant changes, with BMI z-score trending upwards. There was no significant

change in participants identified as a healthy weight. All participants in the school cohort completed the intervention, and three quarters had data included in the primary analysis; 33% did so in the community cohort, with 25% included in the analysis. There was little evidence of change in health behaviours.

3.5.2. Comparison to the wider literature

A Cochrane review on lifestyle interventions for the treatment of obesity in children shows that these interventions may achieve small effects in the short term, however, long-term success is minimal, and the quality of evidence is limited.^{72,90} Whilst the school-based intervention in this analysis showed a small but significant change in BMI z-score in participants identified as living with severe obesity, in this observational analysis I was unable to determine with certainty if this was a result of the intervention and whether these changes would be sustained in the long term.

The school-based intervention showed a greater reduction in BMI z-score than the community-based programme. These findings differ from previous research which describes community settings as an integral component for success on child weight management interventions and cites school-based settings as having little to no effect on outcomes.¹⁴¹ However, many school-based studies are conducted in younger, primary school cohorts who may have less agency over their health behaviours than secondary school students and therefore are more likely to require parental involvement for success.¹⁴² Additionally, a review by Cui et al.¹⁴³ suggested that school-based settings may be more effective for the retention of ethnic minority communities and those from areas of high deprivation although the reasoning for this was not hypothesized.

The school-based intervention showed a small but significant reduction in BMI z-score amongst participants identified as overweight, where the community-based programme did not. Although both programmes provided similar content, the community-based programme was tailored to only those above a healthy weight, and all attendees had to "opt-in" to attendance indicating at least some motivation to change. This contrasts with the universal approach of the school programmes, where participants were required to attend regardless of motivation or baseline BMI, and lessons addressed general health rather than specific weight loss goals. Therefore, it would be expected that the community programme with its targeted, opt-in approach would provide better outcomes; however, I found no evidence of this. It is possible that the increased retention on the school programme where a consistent weekly programme is delivered over ten continuous weeks may have contributed to the positive impact on outcomes compared to the community programme where participants had to actively choose to attend each week. A recent study by Sanders et al.¹⁴⁴ showed that short-term (6- to 12-week) school based interventions may have more success than longer community-based ones due to the short but consistent nature of delivery. It could be that, in the case of Healthy Eagles, the increased attendance, led to greater programme effect.

It should be noted that the community programme may have had benefits beyond those measured in this study such as the opportunity to meet peers with similar experiences, which can reduce feelings of stigma and otherness.^{145,146} Group-based interventions may create a sense of belonging and normalisation, particularly for young people who have experienced bullying or social exclusion related to weight.^{147,148}

The school-based Healthy Eagles programmes are easier to run and, because they do not require paying for a community venue, often cost less per participant. Hence community programmes will need to be more clinically effective to be more cost-effective. I found no evidence of this here. School-based programmes also recruit a much broader sample of participants, including those with the highest level of need who cannot attend a programme in the community. They offer the added benefit of providing a preventative aspect to those attending that are within a healthy weight but may be at risk for excess weight gain in the future. I found no evidence of inappropriate changes in BMI in this group, providing reassurance that a programme can meet the needs of children across a range of BMI.

There is evidence to show that identifying a child as above a healthy weight and referring them to a weight management intervention, if done without due care, can increase their perceived weight stigma.⁶¹ Increased weight stigma, in turn, often leads to an increase in unhealthy weight control behaviours.^{149,150} If universal approaches can be as successful at reducing unhealthy weight as targeted interventions, they may provide an acceptable, if not preferred, alternative for weight management without any of the potentials for weight stigmatisation.

3.5.3. Strengths and limitations

This is the first evaluation to compare a weight management intervention across school and community settings. Although the comparison is not randomised, and indirect, the programme components and delivery team were the same, and the population was similar. One of the strengths of this investigation was the diversity in the participants. Although it is well established that obesity in childhood adversely affects children from

minority ethnic and/or deprived backgrounds, most studies of similar interventions still have a majority of participants from white middle-class backgrounds.^{136,137} In this investigation, 83% of participants came from a minority ethnic background, and 63% came from the two most deprived deciles. However, it is important to note that although the participant population was ethnically diverse, the intervention itself was not meaningfully culturally tailored. Instead, it relied largely on generic resources, with only limited and superficial adaptations, such as the inclusion of some culturally relevant food examples.

Another strength is that this research evaluated an extant programme, typical of those employed in public health practice in the UK. Currently, there is very little evidence of the effectiveness of interventions to treat obesity in routinely commissioned programmes, and available research shows that impact can vary greatly when compared to trial conditions.^{151,152} This study shows the real-world effectiveness of a behavioural weight management intervention designed to meet NICE good practise guidance.¹⁵³

This study has limitations, the first being the lack of control group for comparison. The results showed a small but significant reduction in BMI z-score for participants with severe obesity on the school programme; however, this was not accompanied by changes in behaviour expected to support weight loss. Incomplete or unreliable questionnaire data could explain these findings; however, it is also possible that BMI z-score change reflects random variation arising from regression to the mean. Regression to the mean is a real risk of uncontrolled trials, and limits the ability to draw unequivocal conclusions around cause.¹⁵⁴ However, when I compare these results to the control

groups in randomised controlled trials in similar populations I can see that in both cases the control groups showed non-significant increases in BMI z-score.^{155,156} This is comparable to results from the NCMP which shows that, without intervention, child weight trends upwards over time.⁹ Therefore, although this study does not have a control group, comparable research suggests that the change in BMI would not have occurred in a population that did not receive an intervention.

BMI classification in this study was based on the UK 1990 growth reference charts, which were developed using population data collected during the late 1980s and early 1990s, when ethnic minority groups were less well represented in the UK population.⁴ As the UK population has become increasingly diverse, concerns have been raised regarding the applicability of these reference standards to contemporary multi-ethnic populations.¹⁵⁷ Consequently, the use of standard BMI centiles in this ethnically diverse sample may have resulted in some misclassification of obesity-related risk.

The lack of a control group and bias, particularly due to confounding, are concerns when running a secondary evaluation of existing interventions such as this.¹⁵³ Although regression analysis was used to account for confounding due to age, gender, deprivation, and ethnicity, it is impossible to eliminate all other potential confounding variables when comparing the two settings. Additionally, because completer data was used instead of analysing on an intention to treat basis, bias due to loss of follow-up could affect findings, disproportionately impacting the community cohort as completion rates were much lower in this group.¹⁴⁰ However, Crane et al.¹⁵³ strongly caution against discounting this form of analysis due to weaknesses as they can still provide invaluable insights, especially in complex real-world interventions.

The data were collected in a setting where the priority was delivering the programme, not data collection and, as such, the data was often incomplete or missing. The community cohort had a much lower retention rate than the school cohort, 32.7% vs 100%, respectively, reflecting the “opt-out” approach of the school intervention. The community programme also had a much lower percentage of usable data than the school programme, 24.8% vs 74.3%, respectively. The most likely explanation is that the “rolling” nature of the community programme, in comparison to the “fixed” nature of the school programme, meant measurements or dates were sometimes missed by staff and BMI z-score could not be calculated. The very different retention and analysis rates for the two cohorts may have impacted the analysis results showing the school programme as disproportionately more successful than the community.

Data was collected using non-validated questionnaires. This was done for ease of data collection, as many of the validated questionnaires for this age group are long and onerous. However, it may have meant the data was not as robust or accurate as it would have been were validated questionnaires used. A final limitation is that the changes were examined over 10 weeks only, and it was not possible to assess the longer-term outcomes in this programme evaluation.

3.5.4. Implications and further research

This analysis adds to the growing body of evidence indicating that behavioural weight management interventions (BWMI) for young people tend to show limited effectiveness when implemented outside controlled trial conditions. Even well-designed programmes, such as the HeLP Trial, which demonstrated significant effects during evaluation, have proven less effective in real-world settings.¹⁵⁶ Despite this, local

authorities continue to commission and deliver BWMI as a primary option for weight management support in non-clinical contexts, and such programmes remain endorsed as the gold-standard approach in NICE guidance.¹

Since publication, this analysis has had tangible real-world impact. I have been approached by four local authorities seeking advice on the design and delivery of adolescent weight management services—all asking whether school- or community-based delivery would be more effective. In each case, they were directed to this paper, which provided evidence favouring school-based delivery (albeit with recognition that neither setting showed strong effectiveness). This illustrates the practical relevance of this research, likely due to its grounding in a real-world intervention and its focus on addressing questions emerging directly from service delivery practice.

The finding that the intervention was significantly more effective among children of Black ethnicity and those from more deprived areas is particularly noteworthy, as it suggests the potential for such programmes to help reduce longstanding health inequalities. These groups are disproportionately affected by obesity yet are often under-represented in weight management research and underserved by existing services.¹³⁶ Evidence of greater effectiveness in these populations indicates that school-based delivery may help overcome some of the structural and social barriers that limit engagement in traditional, clinic-based interventions. By providing support in a familiar, accessible environment, these programmes may be better positioned to reach children who typically have the least access to effective weight management resources, thereby contributing to more equitable health outcomes.

Further research should examine the implementation factors that influence the effectiveness of interventions across different settings and identify ways to optimise these to enhance impact. Qualitative research with adolescents and their parents may also provide valuable insights into their experiences and perceptions of such programmes, helping to reduce barriers and improve engagement and outcomes; this is explored further in Chapter 4. There is also a need to investigate innovative modes of delivery beyond the standard ten-week BWMI model which led me to evaluate the feasibility of a digital intervention as one such approach (Chapter 6). Finally, this analysis focused primarily on physical health behaviours and weight outcomes. However, as evidenced throughout this thesis, mental health outcomes, such as weight concern and self-esteem, are closely linked to weight and should be assessed alongside traditional measures.

3.6. Conclusion

This evaluation indicates a small but potentially important advantage of delivering weight management interventions in school settings compared with community-based provision. Although improvements in BMI z-score were modest, changes were proportionate to baseline BMI z-score, suggesting clinically meaningful benefit for those at higher starting levels. Importantly, the school-based model demonstrated greater effectiveness among children of Black ethnicity and those from more socioeconomically deprived backgrounds. These findings suggest that school delivery may improve reach, engagement, and equity, potentially reducing disparities in access to, and outcomes from, weight management support. While effect sizes were limited,

the results support the role of schools as an accessible platform for weight management interventions in this population.

CHAPTER 4: PARENTAL AND ADOLESCENT VIEWS TOWARDS WEIGHT AND WEIGHT MANAGEMENT IN ADOLESCENTS: A QUALITATIVE STUDY.

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

4.1. Summary

This chapter aims to better understand how young people and parents feel about weight and weight management in order to determine better means of support.

I interviewed sixteen young people, all identifying as above a healthy weight, and ten parents of young people, to better understand their views on weight and weight management. The sample included four linked parent-child dyads. The interviews were transcribed and thematically analysed.

Through the interviews, I identified four themes: (i) Weight pressure as a function of societal norms, (ii) the parent-child relationship, (iii) nowhere to turn for help and (iv) role modelling as a means of support. The paired interviews illustrated how adolescents and parents were often responding to the same weight-related pressures, but interpreted and navigated these experiences in different ways. In particular, parental attitudes towards weight appeared to influence how adolescents understood their own bodies, weight concerns, and support needs. Interviewees said the systems designed

to support them in managing their weight were insufficient and potentially harmful, but identified role-modelling as an effective strategy.

These findings confirm that we must rethink how young people are supported with their weight. Many struggle with worries about excess weight and pressure to lose weight yet the systems currently in place are often failing them.

Note: A paper based on this study has been published as follows:

- Little M, Jebb SA, Aveyard P. Adolescent and parental views on weight and weight management: a qualitative study. *Archives of Disease in Childhood* 2025; **110**:630-635

4.2. Introduction

Approximately one-third of adolescents in the United Kingdom (UK) are living with overweight or obesity¹⁵⁸ yet current weight treatment interventions in this age group have limited long-term success, low uptake and high attrition rates.⁷⁰⁻⁷² Adolescence also represents a period that is vulnerable to the onset of disordered eating behaviours, including clinical eating disorders¹⁵⁹ and some evidence suggests that adolescent weight control behaviours may lead to adverse mental and physical health consequences, especially when done without supervision from a qualified health professional.¹⁰⁶ This has led to uncertainty on whether weight reduction behaviours should be employed. However, previous research has shown that 57-80% of overweight adolescents independently attempt weight loss.^{160,161} This is consistent with a survey I conducted with secondary school pupils which showed that 73% had engaged in weight loss attempts and 96% felt pressure to be a certain weight.

This suggests a desire from adolescents to manage their weight and indeed, previous research has shown that, in general, adolescents with excess weight wanted to lose weight and valued the opportunity to do so in a supportive environment.^{93,94} A systematic review by Silva et al.⁹⁶ found that improvements in health were reported to be the primary motivator for weight loss; however, image, self-esteem and social pressure were all highly contributory. When weight treatment programmes focused on body weight and followed a prescriptive, standardised model, participants described despair, shame and uncertainty about their weight.⁹⁴ However, when participants were treated as individuals and their personal needs were focused on in a way that was not weight-based, they felt empowered, safe, and accepting of their bodies.

However, parents are not always supportive of weight loss and are often doubtful of measures of weight status. Qualitative research with parents of children with excess weight demonstrates a lack of trust in Body Mass Index (BMI) as an accurate measure of weight status.^{102,103} The research indicates that often parents underestimate child weight status¹⁰³⁻¹⁰⁵ and, even when weight status is confirmed, underestimate the clinical risks associated with overweight.¹⁰⁴ This can lead to a lack of parental concern over excess weight, with many parents claiming that the weight was either "puppy fat" they would grow out of or that, based on different cultural views on healthy body size, overweight was not a concern and sometimes even desirable.^{103,105,162} Recognition of overweight in children and adolescents increases with parental education level,^{104,105,162} presence of an overweight parent,^{104,163} or female gender.^{162,164}

Despite increased independence during adolescence, parents still play a crucial role in decision making around health behaviours.¹⁰¹ Many parents feel that discussing or treating overweight in adolescents could lead to adverse mental health implications.¹⁶⁵ Parents feel that simply raising the issue of weight with their children will increase the child's perceived weight stigma and feelings of weight-based shame.^{93,102,103} Similarly, adolescents also expressed a desire to avoid weight-based discussions, especially adolescents who considered themselves to be above a healthy weight.¹⁶⁵ A recent study demonstrates a link between parental weight discussions and reduced well-being and dysfunctional eating amongst children.¹⁶⁶ This relationship is especially pronounced if the conversation occurs between mothers and daughters.^{166,167} However, by adjusting tone and language, such as using the term "healthy lifestyle" instead of "weight", negative repercussions can be minimised.¹⁶⁶ The terms "health" or "healthy lifestyle" were preferred over "weight" and "weight loss" by both parents and

adolescents.^{98,102,168} They said that the term “weight” carried a social stigma that could be damaging to mental health.^{98,102}

With weight-related discussions often being avoided, adolescents may wish to lose weight, yet neither they nor their parents feel comfortable initiating conversations about it. To provide appropriate support, it is important to understand adolescents’ own experiences, preferences, and support needs. Although there is increasing recognition of the importance of involving adolescents in decisions about their care, much obesity treatment in this age group continues to be delivered through a parental proxy.¹⁰¹ Consequently, research directly exploring adolescents’ views on weight and weight management remains relatively limited compared with the wider obesity literature.

An important contribution to this evidence base was made by researchers at the University of Oxford, who conducted qualitative interviews with 36 adolescents and 9 parents in 2010 to explore experiences of weight management, treatment preferences, and support needs.¹⁶⁹ Their work provided valuable insight into how adolescents perceive weight and weight management and highlighted the importance of incorporating young people’s perspectives into service design and delivery. The current study builds on this research by exploring the views of adolescents and parents in a contemporary context and examining whether perceptions of weight and weight management have evolved in the 12-13 years since these interviews were conducted. This research also looks at matched parent-child dyads which the above research didn’t do.

The aim of this study is to explore the views on weight and weight management of adolescents with excess weight and parents of adolescents with excess weight. It is

hoped that these findings will lead to recommendations on how to better support adolescents to achieve or maintain a healthy weight.

4.2.1. Patient and public involvement

As part of the PPIE activity undertaken during this thesis, I sought to engage directly with adolescents to better understand their views on discussing weight and weight management. First, I went to an all-girls state secondary school in Buckinghamshire. I was asked to give a presentation to Year 8 students during a school assembly, where I outlined the prevalence of excess weight in adolescence, the risks associated with unregulated dieting behaviours, and the potential influence of social media on body image. Before and after the session I asked students to write down thoughts on whether or not we should be discussing weight. Responses were notably mixed and closely mirrored the findings from my qualitative research. Approximately one third of students felt it was important to talk about weight, one third felt it should never be discussed, and the remaining third felt it was appropriate only in certain circumstances. This diversity of opinion reinforced the sensitivity and complexity of the topic and highlighted the importance of seeking adolescent perspectives before designing or implementing interventions.

Following the assembly, students were invited to complete an anonymous online survey exploring experiences of weight pressure, mental health, and support needs. The results, summarised in **Appendix 4.1**, provided further insight into the everyday realities faced by young people. An overwhelming majority, 96 percent, reported feeling pressure to be a certain weight, while 73 percent disclosed engaging in unregulated weight

control behaviours and 64 percent reported that their weight or weight concern negatively affected their mental health.

Despite this, views on discussing weight with parents or HCPs remained divided, with 34 percent stating that weight should not be discussed at all and a further 23 percent feeling it should only be raised if health was at risk. These findings played an important role in shaping the direction of the thesis, confirming the need for sensitive, non-stigmatising approaches and aligning closely with themes from the qualitative interviews.

Following this, I attended the Bucks Youth Summit, an annual event hosting almost 200 young people from over 30 secondary school and youth groups. Here I put up a stand where I engaged with young people around weight management support. I had 4 pieces of paper with “NHS Website”, “Social Media”, “GP/School Nurse” and “Other” written on the top and asked them to put a sticker on which sheet best reflected where they would turn if they wanted help with their weight; if they chose “other” I asked them to elaborate. One hundred young people answered my question. Almost half (n=48) chose “NHS website” as where they would go for support, one quarter (n=24) chose “GP/School Nurse”, one fifth (n=19) chose social media and almost 10% (n=9) chose “other”. Answers for other included my family (n=4), gym (n=2) and unidentified (n=3).

This PPIE activity provided useful preliminary insights into how adolescents perceive weight and weight-related support. It highlighted the diversity of views on whether and how weight should be discussed, and reinforced the sensitivity of the topic. The findings complemented the qualitative findings presented below and the survey data presented in chapter 5, and helped to contextualise those results. Although exploratory in nature,

this engagement with young people offered practical perspectives that informed the research and suggested potential directions for future studies.

4.3. Methods

4.3.1. Design

Qualitative research methods were considered most appropriate for addressing the aims of this study and exploring how adolescents and parents understand and experience weight, weight concern, and weight management. By focusing on participants' narratives and accounts of their lived experiences qualitative interview methods allow for rich exploration of how individuals interpret and respond to weight-related issues within their social and familial contexts.¹²⁸ This approach also enabled exploration of the complex, sensitive, and multifaceted nature of adolescent weight and body image, including the influence of family relationships, social pressures, stigma, and interactions with healthcare systems.^{128,170}

The study recruited young people aged 13-17 years and living in England and Wales who self-identified as being above a healthy weight. Parents were eligible if they had a child aged 13-17 years who they identified as being above a healthy weight. The original intention was to recruit linked parent-child dyads; however, as weight is often a sensitive topic to discuss, recruitment was challenging, and I therefore switched to include non-linked participants. Recruitment challenges also meant purposive sampling was not feasible and therefore I reverted to a convenience and snowball sampling approach. The number of participants was guided by the concept of information power, whereby recruitment continued until sufficient depth and richness of data had been obtained to address the study objective.^{171,172}

4.3.2. Participants and recruitment

Participants were recruited through youth groups, secondary schools and social media including, Twitter, Netmums, and Nextdoor. Before the interviews took place, potential participants were sent a participant information sheet (PIS) to read through and ask the researcher questions (**Appendix 4.2**). For participants under the age of 16 years the PIS was sent to their parent or carer with an additional simplified PIS sent to the potential participant themselves. Participants were then contacted to ascertain their willingness to take part in the study and verbal consent was obtained. For participants under the age of 16 years, parents consented and participants assented. A £20 retail voucher was given to all participants as compensation for their time.

4.3.3. Data collection

Data was collected using semi-structured interviews, ten with parents and sixteen with young people, conducted between February 2022 and March 2023. Interview guides were developed prior to the study with different guides for parents and for adolescents (**Appendix 4.3**). Both the parent and adolescent interviews covered topics such as feelings towards weight, the effect of weight on the parent/child relationship, and the weight management experience of the young person. Interviews were flexible and content was iteratively adapted based on previous interviews.¹²⁸

All interviews were conducted over the telephone, audio recorded, and immediately uploaded onto a secure drive on the University servers. I took field notes after each interview to capture any initial thoughts on the interview or ways and reasons that it may have diverted from the original interview guide. These initial reflections were analysed with interview transcripts to form background to the interview.

4.3.4. Data analysis

I analysed the data using reflexive thematic analysis to interpret meaning and construct themes.¹⁷³⁻¹⁷⁵ The approach lends itself to research grounded in the literature, yet also allows for an inductive, interpretive, and reflexive approach.¹⁷⁶ As a white female and a mother, I have potential biases around parenting, gender and dieting and, and as a dietitian and post-graduate student have contextual pre-existing clinical knowledge of obesity. I remained mindful of my contextual knowledge and potential biases throughout the analysis. To minimise the influence of personal assumptions, I chose not to predefine themes and instead adopted a data-driven approach.¹⁷⁷ Systematic coding techniques were employed to enhance rigour and reduce the risk of subjective interpretation.^{178,179} I also engaged in ongoing reflexivity, both individually and in discussion with the wider research team, to critically consider how my own perspectives might be shaping the analysis.^{131,176}

The ontological and epistemological positioning adopted within this thesis was informed by subtle realism, as described by Pope and Mays¹²⁸ and elaborated on in Chapter 2 of this thesis. Commonly applied in healthcare research, subtle realism assumes that a reality exists independently of the researcher, whilst recognising that individuals may experience, interpret, and describe that reality in different ways.¹²⁸ Consequently, the aim of research is not to establish a single objective truth, but to develop a plausible and credible account of a phenomenon by drawing upon participants' perspectives and experiences. This position is particularly relevant to the current research, as adolescents and parents often described the same weight-related experiences in very different ways. Subtle realism therefore provides a useful framework for acknowledging the existence of weight-related phenomena, such as obesity, weight

concern, and help-seeking behaviours, whilst recognising that these phenomena are understood and experienced differently by different individuals.

For the initial analysis, interviews were listened to repeatedly for familiarity and notes made on each. The interviews were transcribed verbatim by an external transcription service and the transcriptions were re-read to check for errors and increase familiarity. I uploaded the data to NVivo and coded it, using a reflexive process. Coding was conducted systematically to support transparency and analytic depth; note was made of any points in the interview where the power differential between the interviewer and the participant may have affected the discussion.¹⁸⁰ I was especially aware of this in the teenage interviews where my role as an adult and researcher may have meant they were less likely to disclose personal information or challenge my questioning. By using age-appropriate language, emphasising the voluntary nature of participation, and actively fostering a non-judgmental space, I hoped to reduce the imbalance.

The interviews generated rich and nuanced accounts of adolescents' and parents' experiences of weight, weight concern, and weight management, offering multiple possible avenues for interpretation and analysis. Early interpretations and developing themes were discussed regularly with my supervisors which helped refine the focus of the analysis and identify areas where the findings could contribute new insights. The result of the coding was used to create patterns of shared meaning in the interviews and make note of any differences in opinion or outliers. Codes were grouped into four themes.

Once key themes had been developed, I used the one sheet of paper (OSOP) method to map coded data and ensure a comprehensive interpretation of the dataset.¹⁸¹ This

approach helped visually show patterns, contradictions, and relationships within the data and ensure that the breadth and depth of participants' accounts remained central to the analysis.

In addition to analysis of the individual interviews, I analysed eight of the interviews as linked parent–adolescent dyads. Analysing the paired dyads enabled examination of the interpersonal dynamics between parents and adolescents, including how attitudes, behaviours, and experiences relating to weight appeared to influence one another. This approach also provided insight into how reality was understood and interpreted differently by each member of the dyad, highlighting the relational and contextual nature of these experiences.

The study was approved by the University of Oxford Central University Research Ethics Committee (reference R77048/RE002) and was conducted and reported in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines.¹⁸²

4.4. Results

4.4.1. Participants

Twenty-six participants were enrolled; 10 parents and 16 young people. A further 3 young people and 1 parent expressed interest but did not take part in the study due to scheduling or time constraints. For coding purposes, participants were each given a number and a letter; A for adolescents and B for parents. Of the participants, there were 4 linked parent/child dyads. **Table 4.1** shows the demographic characteristics of the participants.

Table 4.1: Characteristics of study participants

	N	Self-identified ethnicity	Deprivation quintile*	Gender (n)	Age in years (mean; range)
Parents	10	7 White British 1 Black African 1 Black Caribbean 1 White Other	Mean = 3.3 SD = 1.3	Female (10)	n/a
Adolescents	16	8 White British 3 Black African 3 South Asian 1 White Other 1 Asian Other	Mean = 3.3 SD = 0.95	Female (12) Male (4)	16.3 (14-17)
Linked Dyads	4	2 White British 1 Black African 1 White other	Mean= 2.75 SD = 0.5	Parent: Female (4) Child: Female (3) Male (1)	Parent: n/a Child: 15.8 (14-17)

**level of deprivation based on English Index of Multiple Deprivation where 1 is the most deprived and 5 is the least deprived quintile*

The minimum interview length was 15.43 minutes, and the maximum was 37.45 minutes. The mean for the parent interviews was 25.45 minutes, and the mean for the young people was 24.27 minutes.

4.4.2. Themes

Below, I present adolescents' and parents' experiences of weight and weight management. The analysis explores the influence of societal and social media pressures on body image, the ways in which parental attitudes towards weight shape

adolescent experiences, and the challenges families face in discussing weight-related concerns. It also examines perceptions of the limited support available for adolescent weight management and the important role that parents play in modelling health behaviours and supporting young people to navigate weight-related challenges.

Weight pressure as a function of societal norms

Parents and adolescents described substantial pressure on young people to achieve socially desirable body ideals, particularly thinness for girls and athletic or muscular physiques for boys. Adolescents stated that acceptance and popularity were often linked to appearance, with one participant (8A) explaining that “*to be liked or to be popular*” you had to be “*attractive*” and “*slim*”. Although overt weight-based bullying was rarely discussed, participants described a more subtle form of social judgement in which those who did not conform to idealised body standards were treated differently. This was in contrast to the HEXI interviews in which all but one participant described some form of bullying at school.¹⁶⁹ As one adolescent (7A) reflected, although society was becoming “*more accepting towards all the different types of body*,” there remained “*that kind of criticism where you are treated different if you don’t look like the type of body that everyone would prefer you look like.*”

Social media was frequently identified as a key driver of these pressures. Adolescents described being repeatedly exposed to idealised body images, with one participant (13A) observing that “*the most famous people on social media and on YouTube are always like the really skinny people.*” Parents echoed this concern. One mother (6B) described how young people “*go on this social media and they see all these pictures*” and come to believe that they have “*got to be this certain figure, this certain look.*”

Although some adolescents acknowledged that social media could provide information about diet and exercise, many said it reinforced unrealistic expectations around body size and appearance.

Parents were often more concerned about the psychological consequences of these pressures than the physical consequences of excess weight itself. One mother (4B) expressed frustration that *“a woman’s life is from the moment you become aware of it thinking about your weight”* and worried that these concerns had *“definitely started”* for her daughter. Adolescents commonly described some degree of weight concern, and several linked this directly to disordered eating behaviours. One participant (13A) suggested there was a perceived *“social pressure to have an eating disorder,”* explaining that disordered eating had at times become *“a trend”* and that unhealthy behaviours were sometimes portrayed as normal or even healthy and subsequently *“pushed on to their friends.”* Together, these accounts illustrate how societal expectations, social media, and peer influences combined to create a pervasive sense of weight pressure that shaped both adolescents’ body image and adolescent and parental approaches to weight management.

The parent-child relationship

Parents’ own experiences of weight appeared closely intertwined with how they approached conversations about their child’s weight. All parents described themselves as being above a healthy weight, and many spoke about feelings of guilt, blame, or responsibility for their child’s weight status. One mother (8B) explained that when speaking to healthcare professionals she often felt *“bad”* because she believed *“it’s my fault,”* while another parent (9B) reflected that discussions about weight could be *“so*

painful” that some parents “*go into their denial and hope for the best.*” For many, these feelings made weight difficult to discuss, particularly when they feared causing emotional harm. As one mother (4B) explained, “*I don’t like to bring up weight because I don’t want to cause an issue if there’s not an issue there.*” Adolescents were often aware of their parents’ own struggles with weight and, in some cases, avoided raising their own concerns because they did not want to add to their parents’ distress.

In contrast, parents who accepted their own weight status without expressing shame appeared more comfortable discussing weight openly with their children. One mother (3B) spoke matter-of-factly about her daughter’s weight, stating “*we’ll talk about it, she’s overweight,*” and questioning “*why not... talk about it?*” In this family, conversations about weight were normalised and framed as part of everyday life rather than something taboo or stigmatising. Adolescents generally valued this openness and described feeling supported when parents were willing to listen and engage in discussion. For example, one participant (12A) explained that if she needed to lose weight, she would “*speak to my mum*” because “*she’ll give me really good advice.*”

Several adolescents emphasised that they felt comfortable discussing weight, but preferred to initiate the conversation themselves. While some said that weight discussions should begin earlier to reduce stigma, with one participant (15A) suggesting that conversations introduced at ages “*11 and 12*” might feel “*less stigmatised,*” most said that parents and healthcare professionals should only raise the topic when there were clear health concerns. When adolescents did choose to discuss their weight, they often sought validation, practical support, and encouragement rather than reassurance that their concerns were unfounded. One adolescent (1A) described feeling frustrated

when attempts to discuss her weight were “*shut down straight away*” with comments such as “*you’re skinny, you’re fine.*” For these participants, being listened to and having their concerns acknowledged was viewed as a more helpful response than attempts to dismiss or minimise their worries.

Nowhere to turn for help

Both adolescents and parents described a perceived lack of accessible and effective support for adolescent weight management. Parents often viewed existing services as poorly aligned with the realities of family life, citing practical barriers such as time, travel, and competing responsibilities. One mother (3B) explained that a local programme was “*quite far from us*” and, when combined with evening sessions, childcare responsibilities, and learning to drive, was “*not really an option.*” Participants also expressed frustration with the support offered by healthcare professionals. Rather than simply being told that a child was overweight, parents wanted practical guidance and support. As one mother (8B) explained, “*a professional just saying your child is overweight*” was insufficient; what she needed were “*practical suggestions*” and “*recommendations of what I could do.*”

Several adolescents stated that weight concerns were not taken seriously by healthcare services. One participant (11A) reflected that “*it would be nice to lose the weight but I don’t feel anyone has exactly tried to help,*” adding that it often felt as though “*unless the person has an eating disorder the weight is like they don’t talk about it.*” This perception contributed to a broader sense that there was nowhere to turn for meaningful support, despite a desire among many participants to receive help with managing their weight.

In the absence of formal support, many adolescents described turning to the internet and social media for information and advice. Although they recognised that online sources could contain misleading information, several participants viewed the internet as the most accessible option. One adolescent (9A) explained that he would “*probably look online,*” reasoning that if “*a lot of websites are telling you a very consistent thing*” it might provide useful guidance. However, participants were also highly critical of social media content relating to weight loss. One adolescent (12A) described how social media frequently promoted advice that “*just doesn’t work*” and was often “*just like lies.*” Others highlighted the potentially harmful nature of online algorithms, with one participant (5A) explaining that even searching for something relatively benign, such as “*overnight oats, could quickly become a “rabbit hole” that “lead[s] to a negative.*” Together, these accounts illustrate how adolescents often sought support in online spaces while simultaneously recognising the risks associated with relying on unregulated sources of information.

Role modelling as a means of support

Many adolescents described feeling supported by their parents through shared participation in healthy behaviours rather than through explicit discussions about weight. Activities such as exercising together, eating family meals, and engaging in everyday physical activity were often viewed as practical demonstrations of support. One adolescent (7A) described how her father supported her by “*going to the gym with me, having meals with me and sitting down with me, talking about how I am feeling,*” illustrating how emotional and practical support were often intertwined. Adolescents generally felt more motivated when healthy behaviours were undertaken collectively

rather than imposed upon them. As one participant (8A) explained, it felt more supportive when parents said “*we’re gonna all do this together*” rather than “*you need to do this*” or “*you need to do that.*”

Parents were also conscious of their role in modelling healthy behaviours. One mother (2B) described deliberately demonstrating healthy habits so that her children could see that “*these things are really clear and important,*” hoping that this would motivate them to engage in similar behaviours. Another parent (6B) described inviting her daughter to join her at the gym but emphasised that participation was voluntary, explaining that if her daughter wanted to come she would say “*come on, we’ll come together and let’s do this,*” rather than forcing her to attend. These accounts suggested that adolescents valued support that was collaborative, non-judgemental, and based on shared experiences.

At the same time, both parents and adolescents recognised that role modelling could have negative as well as positive effects. Several participants reflected on the influence of parental attitudes towards their own bodies and weight. One mother (1B) described “*the worst thing I do*” as criticising herself in front of her daughter and worried that if she focused on aspects of her own body she disliked, her daughter might “*start looking at herself*” in the same way. This awareness led some parents to consciously modify their own behaviours in an effort to protect their children from developing similar body image concerns. Together, these accounts suggest that parents were viewed not only as providers of support, but also as influential role models whose behaviours and attitudes towards weight could shape how adolescents understood and managed their own health.

4.4.3. Linked parent-child dyads

Four linked parent–child dyads were interviewed and are presented below. These paired accounts illustrated the complex relationship between parents and adolescents when navigating issues relating to weight and weight management. Although both members of each dyad were reflecting on the same shared experiences, their interpretations, meanings, and emotional responses often differed. Examining these accounts side-by-side highlighted how individuals can experience and construct understanding of the same reality in different ways, providing valuable insight into the dynamics that shape weight-related conversations, concerns, and support within families.

Linked Dyad 1: Mother/Daughter, 16yo, White British

In this dyad, the mother described longstanding feelings of shame regarding her own weight and a sense of guilt about her children’s weight. Reflecting on her daughter’s experiences, she acknowledged that her daughter had “*watched us going through the pain and probably especially me, cos I’m always moaning about my weight,*” highlighting her awareness of how her own relationship with weight may have shaped her daughter’s perceptions and experiences. Wanting to protect her children from becoming similarly preoccupied with weight and body image, she avoided weight-focused discussions, did not allow participation in the National Child Measurement Programme, and frequently reassured her daughter that she was “*so thin*” and did not need to lose weight.

However, her daughter described this reassurance as dismissive of her concerns.

Although she did not necessarily aspire to be “*thin*,” she expressed a desire to become stronger and more physically confident, explaining that “*I want to not just be thin, I want to have like muscle and stuff.*” Rather than reassurance, she said that she wanted

practical and supportive guidance, stating that she wished her parents had responded with *“okay, let’s look into some gyms that you can go to”* or helped her identify activities that would support her goals, *“instead of shutting the idea down.”* Having witnessed her mother’s ongoing struggles with weight, the daughter was keen to avoid a similar experience herself, yet simultaneously felt unsupported in managing her own concerns.

Linked Dyad 2: Mother/Son, 14yo, Black African

In this dyad, the mother described herself as being above a healthy weight but, unlike some other parents in the study, did not express shame or embarrassment regarding her weight. Instead, she framed weight primarily in relation to health and fitness rather than appearance and described actively normalising conversations about weight within the family. She explained that she often used herself as an example when discussing weight with her children, telling them *“see boys I’m adding too much weight, look at my belly, look at my thighs,”* before openly acknowledging *“the truth is I need to lose weight boys.”* By positioning herself within these conversations, she said she had *“set that pace to make them feel comfortable”* and created an environment in which discussions around weight could occur without judgement or stigma.

The mother also described taking practical steps to support healthy behaviours within the family, including encouraging physical activity and framing weight management in terms of long-term health. When discussing her son’s weight, she recalled that *“he was receptive”* and responded with *“yes, I know mum,”* because the conversations focused on *“health reasons”* rather than appearance or criticism. This contrasted with other dyads in which weight discussions were avoided or experienced as distressing.

Reflecting this supportive and open family environment, the adolescent described

feeling *“very comfortable speaking to my parents”* about weight and health concerns, adding that *“they just listened and that’s basically it.”* The dyad therefore illustrated how open, non-judgemental communication and parental role-modelling appeared to facilitate adolescent comfort in discussing weight and engaging with health-related behaviour change.

Linked Dyad 3: Mother/Daughter, 16yo, White British

In this dyad, the mother described an awareness that her family tended to be *“on the larger side”* and said that her daughter had inherited a similar body type. Although she acknowledged differences in body size within the family, she resisted framing her daughter as overweight, stating that *“I think she’s a healthy weight. She would not agree. We are never going to be, you know, really skinny, skinny people, we’re just not them people.”* Rather than focusing explicitly on weight loss, she described attempting to *“guide”* her daughter towards good health through family-based healthy lifestyle practices, including regular exercise, portion control, and shared physical activity.

The daughter described these family behaviours positively and felt strongly supported by her mother in managing her health. She explained that her mother was *“very, very helpful”* because *“she does it with me so that I don’t feel stressed,”* particularly in situations such as attending the gym, which she recognised could feel intimidating for young people. She also reflected that *“throughout my entire life I’ve always seen that my parents have always had healthy foods, going on exercises,”* describing how activities such as family dog walks had normalised physical activity within the household.

Although the daughter expressed some frustration that discussions around weight itself were often avoided, she nevertheless stated that growing up in a family environment

where healthy behaviours were consistently role-modelled made it easier for her to engage in those behaviours herself.

Linked Dyad 4: Mother/Daughter, 16yo, White Other

In this dyad, both mother and daughter said that they recognised they were living with excess weight and described wanting support to improve their health. Unlike some participants who avoided discussing weight within their families, both said that weight could and should be discussed openly. The mother challenged the notion that excess weight was inherently stigmatising, arguing that *“it doesn’t always have to be a shameful issue, it can be an issue or something of a concern, it can be a conversation topic.”* Despite this openness, both expressed frustration with what they perceived as a lack of meaningful support from healthcare services. The mother stated that information alone was insufficient, explaining that *“I know all the theory, I know it all,”* and that what she needed was practical support rather than further education.

The daughter similarly described feeling overlooked by healthcare professionals, particularly in relation to the impact of weight on her existing health conditions.

Discussing her hypermobility, she explained that *“having extra weight obviously makes it worse,”* yet said that professionals stopped at advising weight loss without providing practical guidance, recalling being told that *“losing would be helpful”* but left wondering *“I think, I know that, like how?”* She expressed a desire for a more balanced approach to weight management, arguing that *“there needs to be like the middle space where like everyone is respected whatever size they are but still being told you’re overweight.”*

Although she acknowledged the growing emphasis on mental health support, she stated that this had sometimes come at the expense of support for physical health,

observing that “*mental health is being given the importance it needs but then other things like physical health in some cases are being thrown out the window.*” Together, this dyad illustrated a strong motivation to engage with weight management support, coupled with frustration that existing services were perceived as reluctant or unable to provide the practical assistance they were seeking.

4.5. Discussion

4.5.1. Principal findings

Through the interviews conducted in this study, it became evident that weight and weight concern had a notable impact on the lives of both adolescents and parents dealing with excess weight. My analysis of the data yielded various themes that I was able to compare with the existing literature.

4.5.1.1. Weight pressure as a function of societal norms

For this study, weight pressure is defined as social or societal pressure to achieve what social norms consider to be an “ideal” weight or shape. Whilst weight pressure as a term is rarely encountered in the research, many studies use body dissatisfaction, which has been defined as the difference between your actual body and your ideal body,¹⁸³ as a marker of weight pressure. For example, increased pressure to achieve what society deems an ideal weight, and the more unattainable that ideal becomes, the more significant the discrepancy between the actual-ideal self and, therefore, the greater the body dissatisfaction. Body dissatisfaction, as a function of weight pressure, has been linked to depressive symptoms in adolescence, and there is a strong association between body weight, self-esteem and mental health, which shows that increased body weight is a strong predictor of poor mental health outcomes.^{59,184,185}

My research showed that participants found weight pressure exacerbated by social media, led to increased body dissatisfaction. This notion is not new, with extensive literature citing a relationship between increased social media use and body dissatisfaction¹⁸⁶⁻¹⁸⁹ and, in some cases, higher depressive symptom scores.¹⁹⁰ The relationship between social media, adolescent developmental factors and society's overemphasis on the female shape is described in the literature as "the perfect storm" for exacerbating body image concerns in young women.¹⁹¹ Poor self-esteem and body image may provide the causal pathway from increased BMI to poor mental health and, there is evidence that this link could be mediated by improving adolescent body image.¹⁸⁵ However, with social media playing such a significant role in adolescent body image, this would be difficult without changing social media behaviour. The recently announced Australian ban on social media access for children under 16 years of age may provide a valuable natural experiment through which to examine whether reduced exposure to social media leads to lower levels of weight-related pressure, body dissatisfaction, and associated mental health concerns.¹⁹² As other countries, including the UK, consider introducing similar restrictions, there may also be opportunities for international comparative research to explore whether trends in body image, weight concern, and adolescent wellbeing differ between countries that adopt such policies and those that do not.

Female participants, who represented the majority of participants, tended to show more willingness to discuss body image and self-esteem concerns stemming from social media. However, male participants also discussed idealised standards for the male body and the pressure to achieve these. While females are shown to aspire to a "thin ideal", males often aspire to a "muscular ideal" and body dissatisfaction and its

relationship to social media are consistent across both genders.¹⁸⁶ Despite this, mothers showed much more concern about the effect of weight pressure on female adolescents' mental health than on males. This could have been because all the parents interviewed were female and could relate more to their daughters,

Parents in my study were deeply concerned about the pressures young people face regarding their weight and how this could impact their mental health. Previous research shows that parents do not always correlate increased weight status with poor health and they value children's happiness and mental health over maintaining a healthy weight.¹⁰³ However, research prior to the advent of social media may not be as relevant in today's world. Parental restrictions on social media use have been shown to have a positive impact on adolescent mental health;¹⁹³ however many of the parents said they could not adequately control their child's social media use, and therefore this was not an option for them.

In a systematic review, health was seen as the primary motivator for weight loss amongst adolescents, with image described as secondary.⁹⁶ However, the weight pressure that adolescents spoke of was all focused around image and social inclusion; there was no 'pressure to be healthy'. This aligns with another systematic review which showed that adolescents' overwhelming motivation for weight loss was that a healthy weight was seen as socially desirable.⁹⁵ Many stated that although overt weight-based bullying was rare, it was there in subtle ways, like not being included in a peer group or not being able to wear fashionable clothes. This appears to contrast with findings from the University of Bristol, which identified weight as one of the most common reasons for bullying in schools.¹⁹⁴ One possible explanation is that participants in this study may

have interpreted bullying more narrowly, focusing on overt teasing or harassment while describing more indirect experiences, such as exclusion, judgement, or social comparison, as forms of weight pressure rather than bullying. It is also possible that some adolescents were reluctant to disclose experiences of bullying during interviews, as bullying can be a sensitive and potentially distressing topic associated with shame and stigma. Equally, young people who had been bullied may be less likely to volunteer to be interviewed. Despite the apparent discrepancy, the findings suggest that weight-related stigma remained pervasive, even when not explicitly described as bullying.

4.5.1.2. The Parent-child dynamic

The parent-child dynamic was instrumental in how families approached the topic of weight and weight management. Although there is some research looking at parental and adolescent views towards weight and weight management separately,¹⁶⁹ my research is unique in the field as it addresses views of both the parent and child as well as having four matched parent-child dyads. This gave a distinctive lens into how the relationship dynamics effect familial approaches to weight.

All the parent participants described themselves as above a healthy weight and parental feelings towards their own weight status appeared to affect how they approached their child's weight. As with previous research,¹⁹⁵ the parents I interviewed often described a sense of guilt or blame for their child's weight and this seemed to be magnified if the parent felt shame or guilt about their own weight. Parents in my study showed concern for their child's weight, and thus demonstrated more treatment-seeking behaviours, if the child experienced weight-based stigmatisation or bullying.^{162,196} A previous study looking at parent/adolescent body shame showed that

child body shame was positively correlated with parental body dissatisfaction in linked parent child dyads.¹⁹⁷ While feelings of shame were not evident in adolescent interviews, in linked dyads where parents demonstrated body dissatisfaction, children did as well. A recent study showed that parents who experienced weight based stigma themselves were more likely to seek support for their children.¹⁹⁸

Most parents interviewed chose to avoid weight-based discussions with their children. Reasons for this were varied however, many were concerned that discussing weight would lead to disordered eating or mental health concerns and others were just generally unconcerned about their child's weight. According to data from the Health Survey for England, 90% of mothers of children living with overweight and 47% of mothers of children living with obesity still consider their child to be "about the right weight", indicating a lack of awareness about the need for weight loss.¹⁹⁹ Many of the parents also attributed their child's weight to genetics or familial build, which often added to their sense of weight-based shame or guilt. In this study, parents who acknowledge their own weight status, without feeling shame or guilt about it, are more likely to discuss weight openly with their children however, the study is likely to have recruited disproportionately from families that are more open to discussing weight.

Previous research shows that adolescents above a healthy weight, compared to healthy weight adolescents, are more likely to become upset when the topic of weight is raised by a parent or carer.²⁰⁰ Negative maternal comments about weight are associated with low self-worth, depressive symptoms and extreme dieting amongst adolescent children.^{166,201,202} In contrast, parent-child conversations based around health instead of weight meant adolescents living with obesity were less likely to engage in unhealthy

weight control behaviours.^{166,202} My study's adolescents preferred health-based discussions as mirrored in previous research.²⁰³ Adolescent participants also strongly felt that if they raised the issue of weight with their parents they wanted to feel heard and have their concerns acknowledged, this is also mirrored in previous research.²⁰⁴ Encouragingly, recent work from researchers at the University of Bath has developed evidence-based resources to support parents and healthcare professionals in having more constructive conversations about weight with young people.²⁰⁵ Co-developed with adolescents, parents, and healthcare professionals, these resources aim to reduce stigma and promote supportive, person-centred communication around weight and health. Evaluation studies have demonstrated that the resources are acceptable and useful to their intended audiences, suggesting they may offer a practical approach to improving weight-related conversations while minimising potential psychological harm.^{206,207}

4.5.1.3. Nowhere to turn for help

Participants, both adolescents and parents, described a distinct lack of weight treatment support for adolescents. In the UK, General Practitioners (GPs) are often seen as the gateway to health support however participants stated that GPs were reluctant to discuss weight or refer adolescents for treatment. This marries with a recent study which showed that adolescents did not know how to lose weight and said GPs were not helpful in giving the specific and tailored advice they desired.²⁰⁸ Additional research shows that GPs do not routinely take weight and height of children and are unlikely to refer those above a healthy weight to weight management services.²⁰⁹ There may be a few reasons for this, one being that adolescents tend to only

see their GP if there is an acute health concern which may not be the time or place to raise the topic of excess weight.²¹⁰

GPs may also be reluctant to raise the topic of weight if there are no treatment options. Generally, in the UK, adolescent weight treatment programmes are scarce and may not be suitable for the adolescent or even known to the GPs. If GPs are unable to provide or signpost to adequate support for adolescents then perhaps it seems counter-productive to raise the issue. Parents were also aware that very little formal treatment existed and cited barriers to existing interventions such as time, location and conflicting priorities which are all covered extensively in the research.^{211,212} Many parents in my study said it was counterproductive to discuss weight with their children if they had no existing support options to offer, a sentiment echoed by HCPs in similar research.²¹³ And, whilst there are many resources, websites and government schemes to support childhood excess weight there is very little for adolescence. Even when conducting this research, I, as an educated health professional, struggled to find an adequate, evidence-based resource to signpost participants to for more information. This points to a real and acknowledged gap in support for this particularly vulnerable age group.

Adolescents also raised this gap in support and whilst most of them preferred to turn to the internet for advice they stated that there was no website or social media channel which they felt provided clear, helpful, evidence-based support. As such, adolescents ended up on social media outlets or websites which offered, at best, ineffective and, at worst, dangerous advice for adolescent weight loss. A recent paper worryingly demonstrated how an adolescent looking for weight support online, due to complicated algorithms, could be taken down a “rabbit-hole” to worrying and dangerous advice and

behaviour.²¹⁴ By not providing adequate online resources for adolescents to support their weight we may be inadvertently forcing them into uncontrolled territory. This was absolutely reflected in my interviews where participants spoke of dangerous diet and activity behaviours mostly found online.

Previous research in this area has shown that adolescents living with excess weight actually prefer mental health support to be included in treatment, not just physical health.⁷³ Participants in my study highlighted school-based mental health initiatives and noted that school support teams appeared to be far better trained in addressing mental health than physical health. This may just be a reflection of time as in the wake of Covid, mental health has been at the forefront of health priorities^{215,216} and it may be that adolescents are noting the increase in mental health support whilst similar increase in physical health support has been absent. Regardless, for an adolescent to feel that “getting an eating disorder” is the only way to get support for excess weight suggests a broken system and one that may need to be recalibrated as to how weight support is given.

4.5.1.4. Role-modelling as a means of support

Parents and adolescents interviewed for this study showed a positive preference for role-modelling health behaviours. Generally, adolescents described feeling secure and supported if their parent undertook health behaviours with them and for parents, they described feeling more comfortable displaying health behaviours than having to navigate the minefield of weight discussions.

The literature extensively documents the positive effect of parental modelling on adolescent diet.^{29,30} Previous research has shown that family meals are linked to

improved adolescent mental well-being, with potential benefits for reducing disordered eating risk and obesity.^{217,218} Adolescent participants stated that eating healthy meals together as a family not only improved their general diet but for many, helped to overcome previous disordered eating. Parents also said that it was a simple and effective way to support their children.

My findings showed that positive role modelling by parents generally led to positive health behaviours in adolescents and, both parents and adolescents were aware of the potential negative impact of modelling negative health behaviours. During interviews, many participants commented on the harmful effects of negative self-talk related to body shape or weight, as well as unhealthy dieting behaviours. Limited research in the area demonstrates a distinct link between parenting diet behaviours and those of children, especially in mother-daughter dyads.²¹⁹ Additionally, greater frequency of maternal weight comments, either about themselves or others, is associated with reduced self-esteem and increased depressive symptoms amongst daughters.²²⁰

4.5.2. Strengths and limitations

The main strength of this study is that it collects views from both the adolescent and parental perspective. Including both teenagers and parents allows for a more holistic understanding of family dynamics and the potential influences on adolescents' behaviours and motivations around weight. The four linked parent-child dyads, enables direct comparison of perspectives within families. This unique design highlights similarities and differences in how parents and adolescents understand and respond to weight-related issues, shedding light on intergenerational influences and potential barriers to effective support. Overall, the study addresses an under-researched area,

providing nuanced and actionable insights that can inform the design of sensitive, acceptable, and family-centred weight management interventions.

Despite its strengths, this study had some limitations. Despite extensive efforts, participant recruitment proved difficult and was discontinued earlier than originally intended due to practical constraints. Consequently, it is possible that additional interviews may have generated further insights or expanded the range of perspectives captured within the dataset. Whilst I enrolled a diverse range of ethnicities, ages, and deprivation levels, the numbers were limited and therefore drawing broad conclusions on any particular demographic should be avoided. Only mothers agreed to be interviewed, no fathers, and the majority of the young people were female therefore, the results may not be as applicable to the male population.

Recruitment difficulties are common in research on sensitive topics such as weight, particularly among adolescents, who may feel uncomfortable discussing their experiences. Future research should explore alternative recruitment approaches to improve participation and engagement. For example, adolescents may feel more comfortable taking part alongside a friend or peer, which could facilitate discussion and reduce anxiety associated with participation. Recruitment through existing adolescent weight management services or social media may also provide access to young people who are already engaged with the topic and willing to discuss their experiences. Such approaches may increase participant numbers, enhance diversity of perspectives, and provide greater depth and breadth of insight into adolescent experiences of weight and weight management.

As weight status was self-reported, there was no guarantee that participants were in fact above a healthy weight. While the information they shared during interviews, combined with my clinical experience, suggested that many were likely above a healthy weight, this could not be objectively verified.

Adolescent interviews averaged around 25 minutes in duration, adult interviews were slightly longer at 28 minutes. This length was appropriate given the adolescent sample and the sensitivity of the topic. Adolescents may have shorter attention spans and can find longer interviews burdensome, particularly when discussing potentially uncomfortable issues such as weight and body image. The focused interview guide enabled key areas to be explored within this timeframe, while minimising fatigue and maintaining engagement. Interviewing adolescents can be difficult, especially about sensitive topics, such as weight ¹⁹⁷ and this, combined with the power differential between the interviewee, as an adult academic, and the adolescent participants, may have meant they withheld crucial information.

The decision to accept non-linked dyads meant that specific parent-child dynamics were limited and furthermore, individuals who have previously sought weight management or have higher concerns about their weight may have been more inclined to participate in this study, which could bias the results. Additionally, the convenience and snowball sampling approaches, may mean less variation in demographics.

4.5.3. Implications and further research

This study indicates that weight pressure and the desire to achieve an “ideal” body weight were primary concerns among both young people and their parents. These findings suggest that weight management interventions should not focus solely on

weight reduction, but also on helping individuals cope with external pressures—particularly those reinforced by societal norms and social media—to attain an idealised body shape. There is also scope for future research to explore how these societal norms are perpetuated and whether upstream strategies could help to reduce the weight pressures experienced by young people

This study found that many adolescents preferred weight discussions to be initiated sensitively and in response to health concerns, rather than routinely initiated by health professionals. This contrasts with current best practice guidance, which recommends that health professionals take every opportunity to raise the issue of weight and refer young people to appropriate interventions.¹ Further research is therefore needed to identify acceptable and effective strategies for supporting adolescents with weight-related concerns that do not rely solely on health professional-led approaches.

At the time of conducting this research, GLP-1 agonists were not approved for use by the NHS in adolescents and, therefore, were not covered in these interviews.²²¹

However, subsequent research has suggested these drugs are likely effective in this population with very few side effects and could be a potential future avenue of obesity treatment in the UK.²²²

Lastly, both young people and parents expressed the view that existing weight management interventions are not fit for purpose, leaving them feeling that there is nowhere to turn for support. This highlights the need for alternative strategies that better align with the needs and preferences of young people. In Chapter 6, I examine whether a digital intervention could represent a feasible and acceptable approach to supporting weight management within this population. However, digital delivery represents only

one potential solution, and further exploration of a broader range of approaches is essential to ensure support options are accessible, acceptable, and effective for all young people.

4.6. Conclusions

My findings suggest a variable dynamic between adolescents who are overweight and their parents. Weight concern, encompassing mental, physical, and psychosocial health, was pervasive amongst both parents and adolescents who agreed to be interviewed for this study, and for young people societal pressure was described as the primary motivator for weight loss. Parents' feelings about their own weight appeared closely linked to both adolescent weight concerns and help-seeking behaviours, suggesting that fostering greater parental acceptance of body weight and reducing feelings of guilt and shame may have positive implications for adolescents' experiences of weight concern. Although national guidance emphasises the importance of discussing weight with children and young people, participants in this study described a range of preferences regarding how and when such conversations should occur. Some adolescents reported feeling more comfortable initiating discussions themselves or discussing weight in the context of health concerns, while parental role-modelling of healthy behaviours was often viewed positively. These findings highlight the importance of considering adolescents' perspectives when implementing weight-related guidance in practice.

CHAPTER 5: WEIGHT CONCERN AND DESIRE FOR WEIGHT LOSS

SUPPORT IN ADOLESCENTS: RESULTS FROM A LARGE CROSS-SECTIONAL SCHOOL SURVEY

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

5.1. Summary

This analysis uses data from the OxWell Student Survey—a large, school-based health and wellbeing survey administered annually by the University of Oxford’s Department of Psychiatry to more than 30,000 young people. I added two items to the 2023 survey: “To what extent do you worry about: my body shape or weight?” and “Would you like help to lose weight?”

I first analysed the frequency of weight concern and desire for weight support across the whole sample and within key demographic groups. I then used regression models to examine two things: which demographic factors were associated with higher weight concern and which were associated with wanting weight support. Finally, I tested whether adolescents with greater weight concern were more likely to desire weight support, while accounting for demographic differences.

Of 34,245 respondents (aged 11–18 years), 41% reported weight concern and 30% expressed a desire for support. Weight concern was more common in girls, gender

minorities, older students, and those from deprived backgrounds. Desire for support was higher in girls and gender minorities but did not vary by deprivation. Weight concern strongly predicted desire for support however this varied greatly by ethnicity, age, gender and deprivation level.

These findings show that weight concern is strongly associated with adolescents' desire for weight support and should be recognised within both the design and recruitment of weight management programmes. Additionally, given its pervasiveness, universal approaches to weight concern, independent of weight status, may offer the most effective way to identify and support the large proportion of young people who could benefit.

Note: A paper based on this study has been published as follows:

- Little, M., Fazel, M., Jebb, S. A., Wane, S., & Aveyard, P. (2026). Weight concern and desire for weight loss support in adolescents: Results from a large cross-sectional school survey. *JCPP Advances*, e70124.

5.2. Introduction

Weight concern, often conceptualised as body dissatisfaction, is highly prevalent among adolescents, with up to one third of girls and one quarter of boys reporting dissatisfaction with their weight or shape.^{223,224} Evidence suggests that weight concern is associated with poor mental health, irrespective of actual weight status^{183,225} with internalised pressure to achieve an idealised body shape linked to depressive symptoms and broader psychological distress.^{58,225} A growing body of research indicates that societal norms, media portrayals, and peer influence play a role in shaping adolescents' perceptions of body image and contributing to the development of weight-related concerns.^{190,226}

Despite strong societal pressure to attain an 'ideal' body weight, there is limited research examining whether weight concern translates into a desire for structured weight loss support. A 2022 study by Ahmed et al. reported that weight loss attempts were common among adolescents, including those within a healthy weight range.¹⁶⁰ However, it remains unclear how many young people desire formal support to manage their weight and how weight concern may influence any desire for weight loss support. Adolescents' willingness to seek or engage with weight management services may be influenced by several factors, including stigma, shame, and previous experiences with healthcare providers.^{227,228} These considerations complicate the relationship between weight concern and help-seeking behaviour.

I aimed to use a large school-based dataset to assess the prevalence of weight and shape concern and desire for weight management support among UK based adolescents. I examine how patterns varied across demographic factors including age,

gender, ethnicity, and socioeconomic status. Furthermore, I investigate whether weight concern independently predicts desire for weight-related support, and whether this relationship is moderated by demographic characteristics.

5.3. Methods

5.3.1. Survey design and procedure

The OxWell Student Survey is a large, school-based, online health and wellbeing survey conducted annually across participating schools in England.²²⁹ Designed to obtain population-level insights into young people's mental health, behaviours, and lived experiences, the survey collects detailed information on demographics, emotional wellbeing, physical health, lifestyle behaviours (such as sleep, screen use, diet and physical activity), as well as risk and protective factors including relationships, school engagement, and service use. The survey is completed anonymously during school hours, enabling high response rates and the inclusion of students who might be less likely to participate in traditional research. Its broad scope and large sample size make OxWell one of the most comprehensive youth wellbeing datasets in the UK, providing robust evidence to inform policy, service planning and intervention development for children and adolescents. Full survey details are provided elsewhere.²²⁹ The survey was first launched in 2019 and repeated in 2020, 2021 and 2023. For this analysis I will be using the 2023 data.

Participation in the survey is organised through schools which are invited via their local authority. Data is collected from year 4 (8-9 years) through to year 13 (17-18 years) however for the purposes of this analysis I will only be using data from years 7 to 13.

The survey consists of approximately 200 questions, taking on average 15 to 40 minutes

to complete. The 2023 survey was conducted in 185 schools in six different geographic locations. Ensuring a wide range of demographic variability.

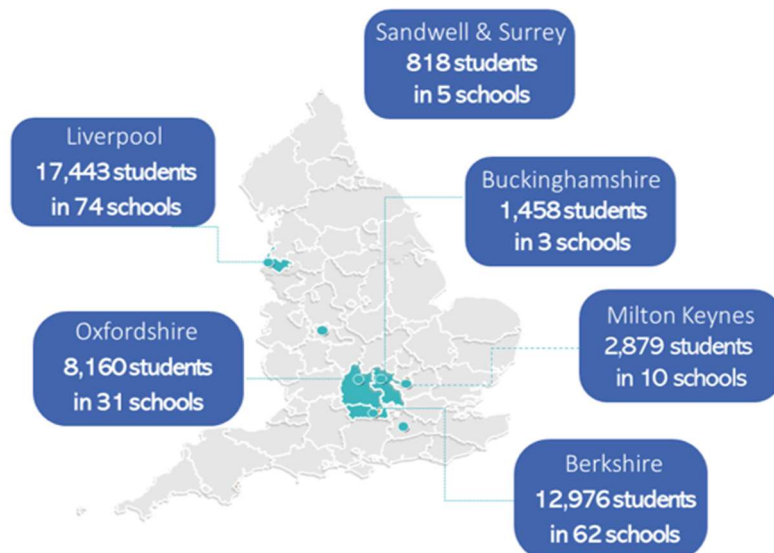


Figure 5.1: Geographic distribution of OxWell School Survey. Reproduced with permission from the OxWell School Survey Team

Given the scale, diversity, and established infrastructure of the OxWell School Survey, it represented an ideal vehicle for collecting robust population-level data on weight concern and weight support among adolescents. Because issues relating to weight and body image are often associated with shame, the survey's anonymous format may have helped to minimise the stigma surrounding this topic. In addition, its in-school delivery ensured participation from groups that are typically under-represented in research, thereby strengthening the inclusivity and generalisability of the findings.

I approached the OxWell team in autumn 2022, who agreed to incorporate two additional items into the 2023 survey to assess weight concern and desire for weight support among young people. The inclusion of a weight-concern item was motivated by its frequent emergence as a salient theme in my qualitative interviews with adolescents

and their parents. The desire-for-support item was added to address an unresolved question from the interviews: whether young people wished to access formal weight management support, or whether concerns about stigma or exacerbating weight-related distress might deter them. Although I contributed to the development and refinement of the item wording, final approval rested with the OxWell survey team. Nevertheless, the final items were well aligned with, and effectively captured, the constructs central to my research aims.

5.3.2. Ethics and consent

Participation in the OxWell Student Survey was entirely voluntary, and no incentives were offered. Participation took place during school hours under teacher supervision and participants could skip any question they did not wish to answer.

The study employed a passive (opt-out) consent process: parents or guardians of pupils under 16 years old were provided with detailed information about the survey and instructions on how to withdraw their child if they did not wish them to participate. If no opt-out response was received, parental consent was assumed. Pupils aged 16 years and older provided their own informed consent directly before completing the survey. To protect anonymity and encourage honest responses to sensitive topics, no personally identifying information—such as names, addresses, or dates of birth—was collected.

Data were collected and stored securely in accordance with GDPR and University of Oxford data protection policies. The study was reviewed and approved by the University of Oxford Research Ethics Committee (reference R62366). The study was reported using the STROBE reporting guidelines.²³⁰

5.3.3. Measures

5.3.3.1. Outcome measures

The outcome variable of “**body shape or weight concern**” was derived from the question “To what extent do you worry about: my body shape or weight?” Participants provided a scaled answer as follows: not at all worried (0), not very worried (1), quite worried (2), worried (3), extremely worried (4).

The “**desire for weight support**” outcome variable was derived from the question, “Would you like help to lose weight?”. Possible answers were yes, no, I don’t know and prefer not to say. A no-response answer was also given to participants who saw the question but chose not to respond.

5.3.3.2. Demographic measures

Year group: The survey asked, “**What is your year group?**” Possible answers ranged from year 7 to year 13. As this is a school-based survey and delivered according to year group, not age, year group is used as a proxy for age.

Gender: The survey asked “**What is your gender?**” Possible answers were “female”, “male”, “other”, and “prefer not to say”. If participants answered “other” it was followed by a free-text box where they could expand on their answer. In the data cleaning stage, all free text responses were analysed and regrouped into four categories according to their responses: female, male, gender diverse (GD), and gender non-disclosing (GND).²³¹ Anyone who saw the question but chose not to respond was put into the gender non-disclosing group.

Ethnicity: The survey asked, “**What is your ethnic group?**” Answers were presented as 18 options and during the data cleaning stage were grouped into 6 categories according to the 2021 census classification 6a.²³²

- Asian, Asian British or Asian Welsh
- Black, Black British, Black Welsh, Caribbean or African
- Mixed or Multiple ethnic groups
- White
- Arab
- Other ethnic group

A no-response category was also used in the analysis for those who saw the question but chose not to respond.

Deprivation: To calculate deprivation, the following eight questions were used adapted from the Wales Young People’s Survey on Child and Family Poverty.²³³ Each question was scored by participants as 1 (never or hardly ever), 2 (some of the time) or 3 (often). Once non-respondents were filtered out, the mean score of these 8 questions was taken to give each participant an overall deprivation score.

1	I worry about not having enough money for the things my family needs e.g. food, bills, electric or gas
2	My family uses food banks
3	The house I live in is cold and/ damp
4	At school, I am unable to afford the right uniform, games kit, books, equipment, or go on trips
5	At school, I am unable to afford to eat
6	At home, I do not have enough space to do things like homework or chill out

7	At home, I have no internet access or poor internet access
8	At home, I go to bed hungry because there is not enough food in the house

5.3.4. Analysis

5.3.4.1. Frequency analysis

The frequency for each of the above outcome variables was calculated both overall and by demographic factors such as year group, ethnicity, gender and level of deprivation. These were then plotted to show a graphical representation of distribution. All analysis was done in R.

5.3.4.2. Regression analysis

For the outcome measure weight concern, I calculated the odds ratio for each predictor variable associated with reporting one level higher of concern about their weight using ordinal logistic regression, mutually adjusted for all other independent variables. Answers of 0 to 4 were included (the answer of no response was removed).

For the outcome measure of desire for weight support, I used binary logistic regression to calculate the odds ratio for desire for weight loss support versus not wanting it, excluding other response options ('not sure' and 'prefer not to say'). Again, all models were mutually adjusted for the included predictors.

The independent/predictor variables used for both analyses were year group, gender, ethnicity and deprivation. For the regression analysis, the deprivation score was converted to an ordinal variable with categories of 1-1.99, 2-2.99 or ≥ 3 dependant on the average score of the 8 deprivation questions. School ID was used as a random

effects variable to account for clustering within schools. This accounts for any between-school variation that could affect the outcome variable.

To examine whether weight concern was associated with desire for weight support, a logistic regression model was fitted with desire for weight support as the outcome variable. Weight concern was included as the primary predictor, alongside demographic variables (gender, ethnicity, year group, and deprivation), which were included as covariates. School ID for individual schools was included as a random effect to account for clustering within schools. An initial model was run without interaction terms to assess the main effects of demographic variables and weight concern on desire for weight support, independent of other variables. To examine whether the association between weight concern and desire for support varied by demographic subgroup, four separate models were run, each including an interaction term between weight concern and one demographic variable (e.g., gender, ethnicity). Results are reported as odds ratios with corresponding confidence intervals and p-values.

5.4. Results

5.4.1. Study population

Data for this analysis was collected from February - March 2023 and 43,734 students participated from 105 primary schools, 70 secondary schools and 10 further education colleges primarily across four different regions in England – Berkshire, Liverpool, Milton Keynes, and Oxfordshire. A total of 34,245 secondary school students participated in the 2023 OxWell Survey. Of those, 1,280 (3.7%) were excluded as they didn't complete the consent correctly. A further 2,545 (7.4%) were excluded from the *weight concern* analysis as they did not get far enough in the survey to answer that question, and an

additional 10,384 (30.3%) were excluded in the weight *support* analysis as they did not get sufficiently far in the survey to see that question (**Figure 5.2**).

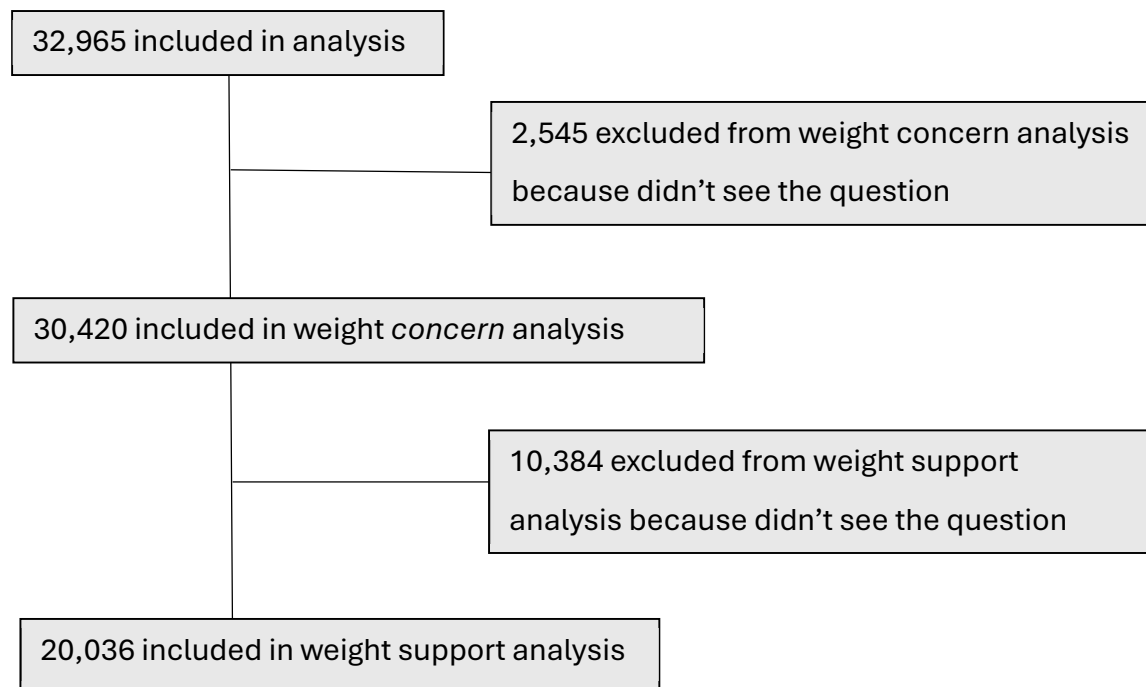


Figure 5.2: Flowchart of Participants

Table 5.1 displays the demographic factors for each analysis group. The groups were similar though with fewer participants in the second analysis, which included the questions on weight support, as these questions came later in the survey.

Table 5.1: Characteristics of participants by analysis group

	Total (32,965)		Weight Concern Analysis (30,420)		Weight Support Analysis (20,036)	
Year Group	(N)	(%)	(N)	(%)	(N)	(%)
7	6900	20.93	6421	21.11	4070	20.31
8	6259	18.99	5925	19.48	3997	19.95
9	6002	18.21	5596	18.40	3762	18.78
10	4693	14.24	4302	14.14	2758	13.77

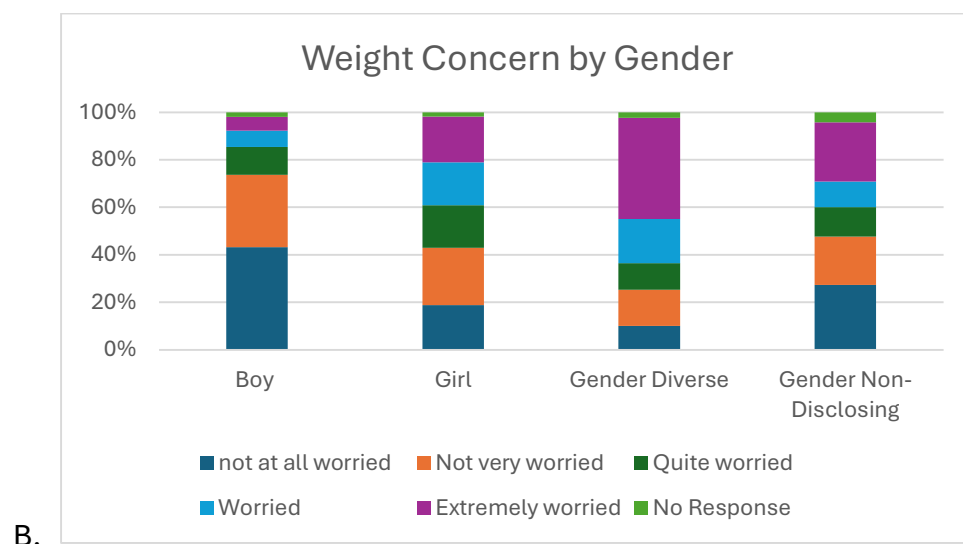
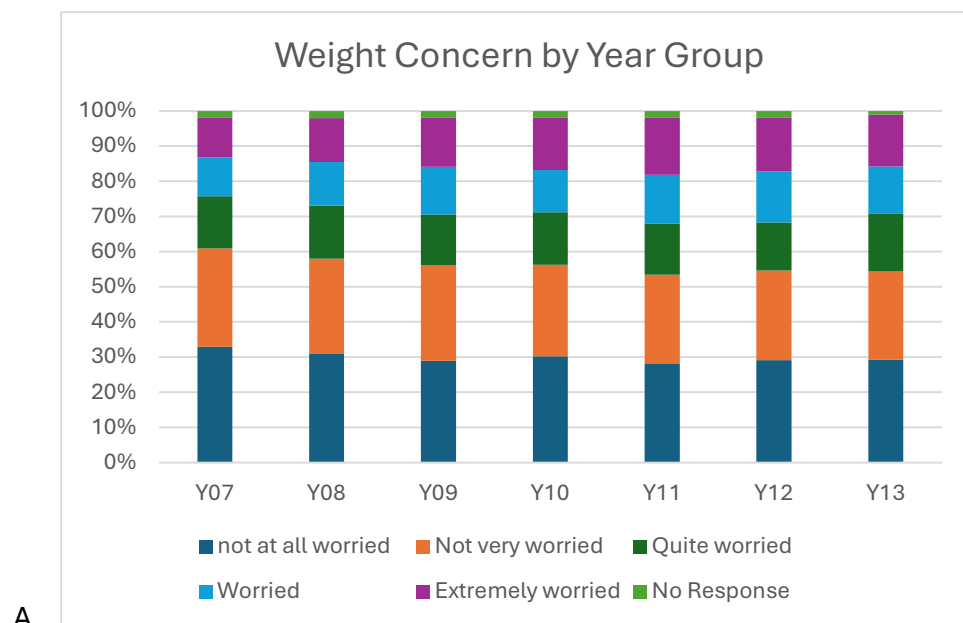
11	4480	13.59	4072	13.39	2728	13.62
12	2810	8.52	2507	8.24	1661	8.29
13	1821	5.52	1597	5.25	1060	5.29
total	32965	100	30420	100	20036	100
Ethnicity	(N)	(%)	(N)	(%)	(N)	(%)
White (aggregated)	17148	52.02	16046	52.75	10784	53.82
Mixed (aggregated)	1812	5.50	1687	5.55	1113	5.56
Asian (aggregated)	4546	13.79	4233	13.92	2946	14.70
Black (aggregated)	1621	4.92	1454	4.78	862	4.30
Arab	601	1.82	567	1.86	331	1.65
Other	733	2.22	678	2.23	410	2.05
No Response	6504	19.73	5755	18.92	3590	17.92
Total	32965	100	30420	100	20036	100
Gender	(N)	(%)	(N)	(%)	(N)	(%)
Girl	16045	48.67	14937	49.10	10391	51.86
Boy	15038	45.62	13784	45.31	8554	42.69
Gender Diverse	414	1.26	389	1.28	303	1.51
Gender non-disclosing	1468	4.45	1310	4.31	788	3.93
Total	32965	100	30420	100.00%	20036	100.00%
Mean Deprivation	1.16 (SD=0.29)		1.16 (SD=0.29)		1.15 (SD=0.27)	

5.4.2. Weight concern

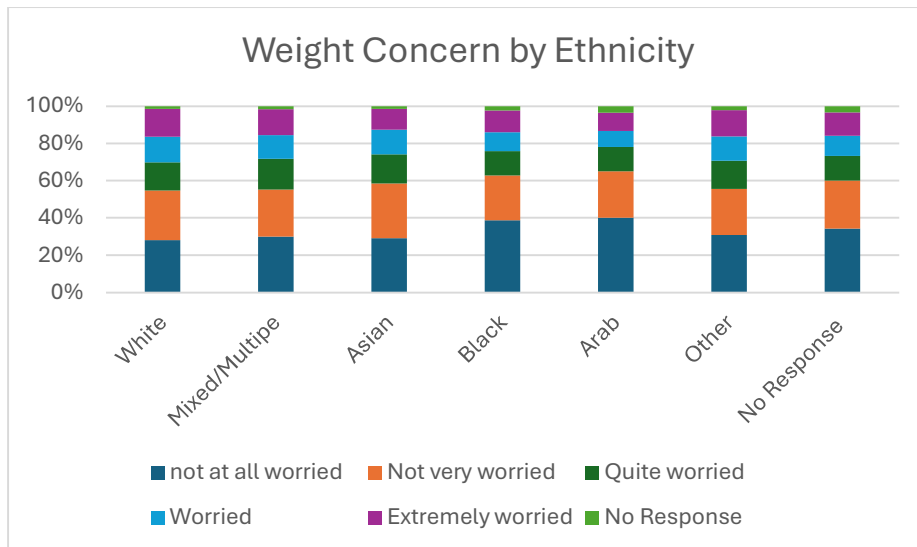
Of the 30,420 young people included in this analysis, 41.2% were either quite worried, worried or extremely worried about their weight; of which 13.7% were extremely worried. Full Prevalence data broken down by demographic can be found in **Appendix 5.1**.

Compared to boys, concern was higher among girls (OR 3.56 95% CI [3.36, 3.78], p-value <0.001), gender non-disclosing (OR 3.70 95% CI [3.23,4.25], p-value<0.001) and gender diverse students (OR 8.25 95% CI [6.78,10.23], p-value <0.001). Weight concern increased slightly with age, with year 8 (age 12-13 years) students (OR 1.14 95% CI [1.07, 1.21], p-value <0.001) showing less risk of weight concern than year 13 (age 17-18 years) students (OR 1.42 95% CI [1.26, 1.60], p-value <0.001).

Compared with people from the White ethnic group, people from Asian, Black, and Arab ethnic groups had lower weight concern.



C.



D.

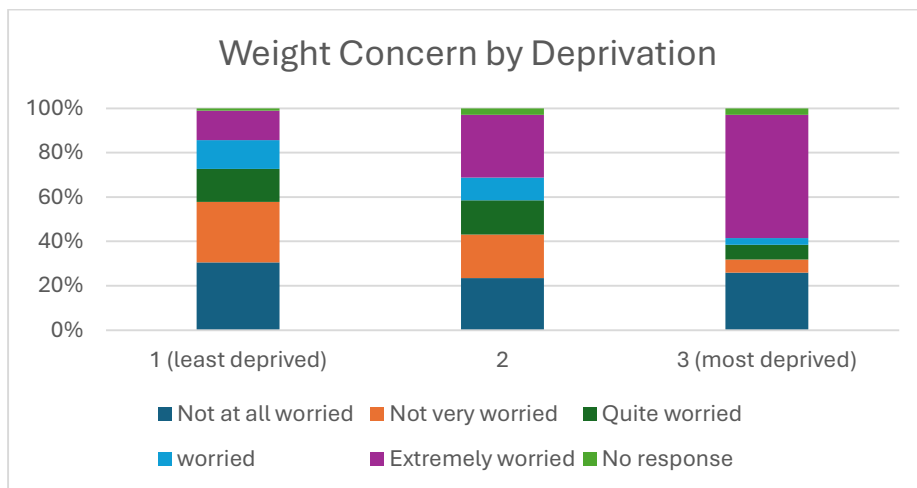


Figure 5.3: Prevalence of weight concern by (A) Year group. (B) Gender. (C) Ethnicity. (D) Level of Deprivation

Table 5.2: Mutually Adjusted Odds Ratios from Logistic Regression Models of Demographic Predictors of Weight Concern and Desire for Weight Management Support

	Weight Concern¹		Desire for Weight Support²		Desire for Weight Support (adjusted for weight concern)³	
	odds ratio (95% CI)	P-value	odds ratio (95% CI)	P-value	odds ratio (95% CI)	P-value
Weight Concern					12.43 (9.26,16.68)	<0.001
Y07	ref		ref		ref	
Y08	1.14 (1.07, 1.21)	<0.001	1.14 (1.01, 1.28)	0.020	1.07 (0.94,1.23)	0.290
Y09	1.23 (1.16, 1.31)	<0.001	1.19 (1.05, 1.33)	0.004	1.07 (0.94,1.23)	0.300
Y10	1.21 (1.12, 1.31)	<0.001	1.20 (1.06, 1.35)	0.004	1.04 (0.89,1.22)	0.570
Y11	1.32 (1.22, 1.43)	<0.001	1.11 (0.98, 1.24)	0.115	0.85 (0.74,0.98)	0.030
Y12	1.38 (1.25, 1.52)	<0.001	1.26 (1.08, 1.47)	0.004	1.02 (0.86,1.22)	0.850
Y13	1.42 (1.26, 1.60)	<0.001	1.08 (0.91, 1.29)	0.375	0.79 (0.65,0.97)	0.020
Gender Boy	ref		ref		ref	
Gender Girl	3.56 (3.36, 3.78)	<0.001	2.56 (2.37, 2.77)	<0.001	1.40 (1.27,1.55)	<0.001

Gender Diverse	8.25 (6.78, 10.03)	<0.001	4.14 (3.14, 5.44)	<0.001	1.34 (0.90,1.98)	0.140
Gender non-disclosing	3.70 (3.23, 4.25)	<0.001	2.25 (1.85, 2.73)	<0.001	1.35 (1.05,1.74)	0.020
White Ethnicity	ref		ref		ref	
Mixed/multiple Ethnicity	0.90 (0.81, 0.99)	0.023	1.09 (0.94, 1.28)	0.254	1.16 (0.96,1.41)	0.110
Asian Ethnicity	0.83 (0.76, 0.89)	<0.001	1.03 (0.92, 1.16)	0.555	1.08 (0.96,1.22)	0.200
Black Ethnicity	0.65 (0.59, 0.72)	<0.001	1.11 (0.94, 1.29)	0.258	1.40 (1.15,1.71)	0.001
Arab Ethnicity	0.61 (0.51, 0.72)	<0.001	0.97 (0.74, 1.28)	0.855	1.40 (0.99,2.00)	0.050
other Ethnicity	0.98 (0.84, 1.15)	0.747	1.22 (0.97, 1.55)	0.112	1.21 (0.92,1.59)	0.170
No Response	0.84 (0.80, 0.89)	<0.001	1.01 (0.92, 1.11)	0.782	1.11 (0.98,1.24)	0.100
Deprivation	3.00 (2.24, 4.03)	<0.001	1.43 (0.84, 2.43)	0.113	1.65 (1.20, 2.26)	0.001

Note:

¹Association between demographic variables and weight concern.

²Association between demographic variables and desire for weight management support (unadjusted for weight concern).

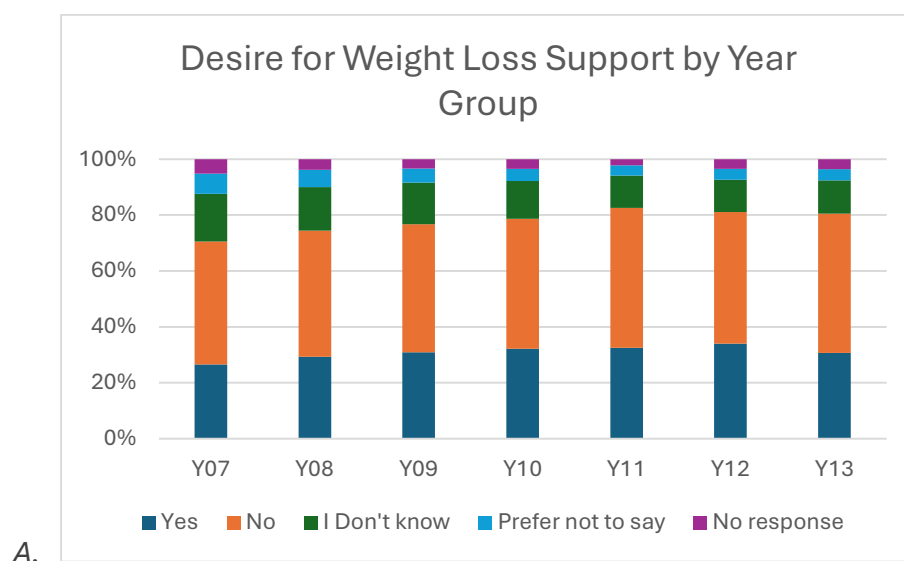
³Association between demographic variables and desire for weight management support, mutually adjusted for both demographics and weight concern.

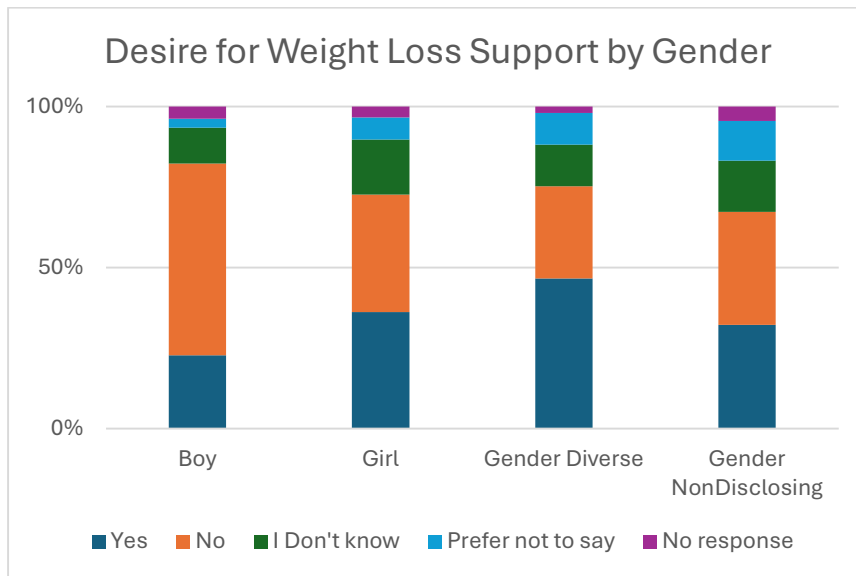
All models are mutually adjusted for demographic covariates, with school ID included as a random ef

5.4.3. Desire for weight support

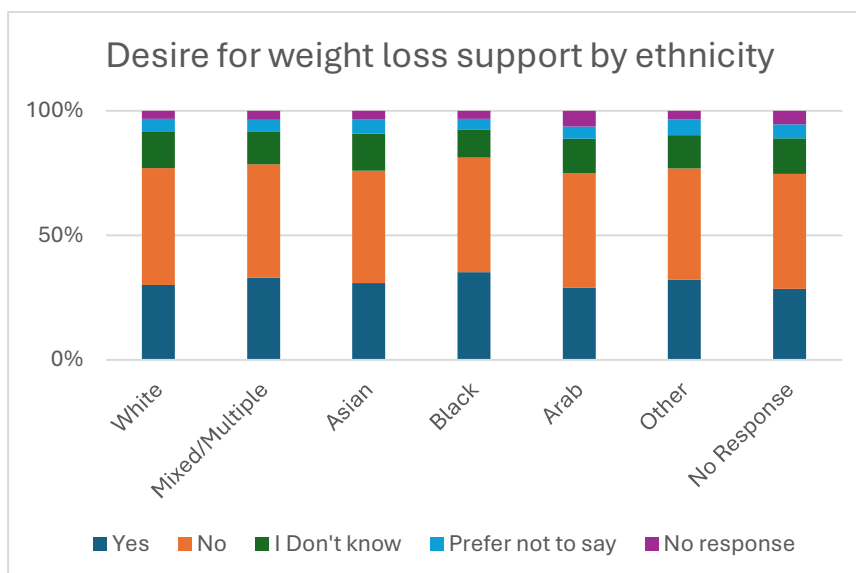
Of the 20,036 participants included in the weight support analysis just under one third expressed a desire for weight loss support, just under half wanted no support and 14% did not know. Full prevalence data for weight support can be found in **Appendix 5.1**.

Girls (OR 2.56 95% CI [2.37, 2.77], p-value <0.001), gender diverse (OR 4.14 95% CI [3.14, 5.44], p-value <0.001) and gender non-disclosing students (OR 2.25 95% CI [1.85, 2.73], p-value <0.001) were all more likely than boys to desire weight support. There was no evidence of any variation in relation to ethnicity or deprivation. Compared to Year 7 (age 11-12 years), there was evidence of modestly higher desire for weight-loss support in older children (**Table 5.2**).





B.



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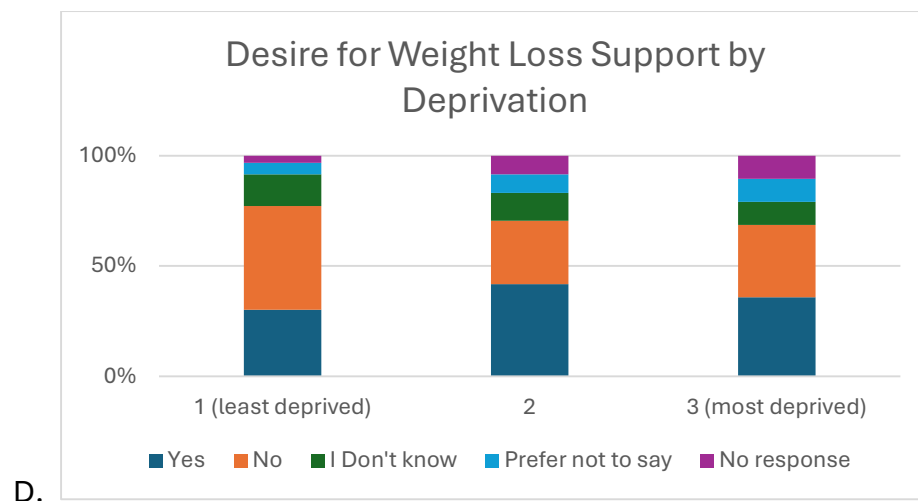
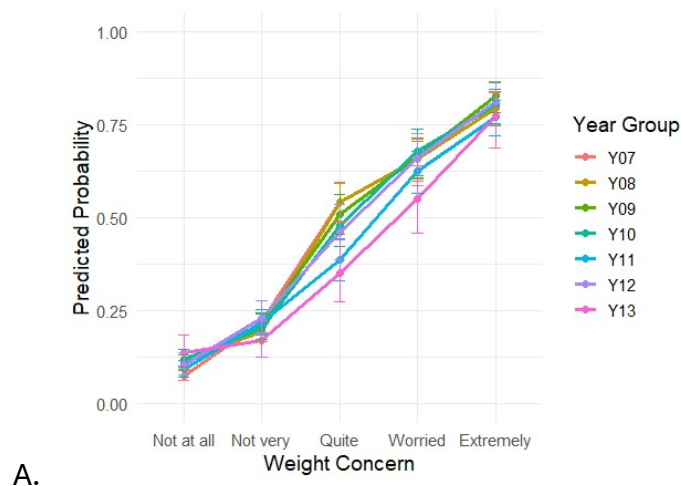


Figure 5.4: Prevalence of weight concern by (A) year group. (B) Gender. (C) Ethnicity. (D) Level of Deprivation

5.4.4. Desire for weight support as a function of weight concern

Increased weight concern was associated with a higher likelihood of desiring weight support across the full sample (OR 12.43, 95% CI [9.26, 16.68], $p < 0.001$). However, this effect varied significantly by subgroup. After adjusting for weight concern, adolescents of Black ethnicity had a higher likelihood of desiring support compared to their White peers (OR 1.40, 95% CI [1.15, 1.71], $p < 0.001$). Students in Year 11 (OR 0.85, 95% CI [0.74, 0.98], $p = 0.03$) and Year 13 (OR 0.79, 95% CI [0.65, 0.97], $p = 0.02$) were significantly less likely than those in Year 7 to want support and, adolescents from the most deprived areas showed greater desire for support compared to the least deprived (OR 1.65, 95% CI [1.20, 2.26], $p = 0.001$). Girls (OR 1.40, 95% CI [1.27, 1.55], $p < 0.001$) and gender non-disclosing respondents (OR 1.35, 95% CI [1.05, 1.74], $p = 0.02$) were more likely than boys to desire support, even after accounting for their level of weight concern (**TABLE 5.2**).

Using single-interaction models, I examined how demographic factors moderated the relationship between weight concern and desire for weight support (**Figure 5.5**). The association was significantly stronger among girls (OR = 3.35, 95% CI [2.70, 4.16], $p < 0.001$) and gender diverse young people (OR = 2.46, 95% CI [1.02, 5.94], $p = 0.047$) compared to boys. In contrast, weight concern had a significantly weaker association with desire for support among those of Black (OR = 0.46, 95% CI [0.30, 0.71], $p < 0.001$), Arab (OR = 0.39, 95% CI [0.18, 0.86], $p = 0.018$), and Other (OR = 0.28, 95% CI [0.15, 0.50], $p < 0.001$) ethnicities, and among participants who did not disclose their ethnicity (OR = 0.64, 95% CI [0.49, 0.82], $p < 0.001$), relative to those of White ethnicity. A weaker association between weight concern and desire for support was observed in Year 13 students (OR = 0.59, 95% CI [0.38, 0.92], $p = 0.02$) and in those from the most deprived group (OR = 0.10, 95% CI [0.02, 0.44], $p = 0.002$), compared to their respective reference groups.



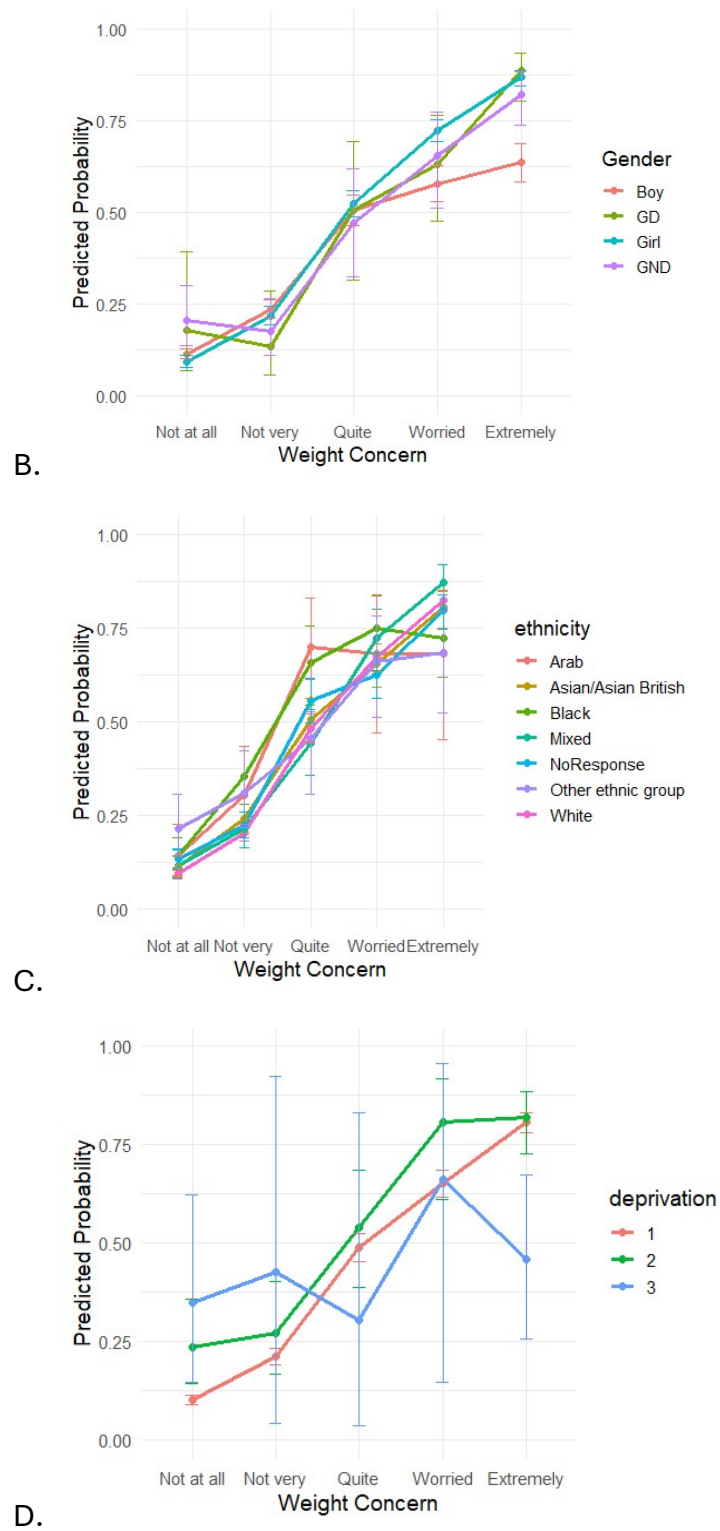


Figure 5.5: Predicted Probability of desiring weight support by weight concern and (A) Gender (B) Ethnicity (C) Year Group (D) Level of Deprivation

5.5. Discussion

5.5.1. Principal findings

In a large general health and wellbeing survey of adolescents, 41% expressed some level of weight concern. Weight concern increased with age, White ethnicity and with increasing levels of deprivation. Girls, gender non-disclosing and particularly, gender diverse young people, were all much more likely to report weight concern than boys.

In addition, one third of survey respondents reported a desire for weight loss support. This increased slightly with age but with little variation by ethnicity or deprivation. Girls, gender non-disclosing and gender diverse young people were all more likely than boys to want support.

Adolescents who reported higher weight concern were substantially more likely to express a desire for weight management support, with a twelvefold increase in odds compared to those without concern. However, this association varied significantly across demographic subgroups. After accounting for weight concern, adolescents of Black ethnicity and those from the most socioeconomically deprived backgrounds were more likely to want support, whereas older students (Years 11 and 13) were less likely to do so than those in Year 7. Girls and gender non-disclosing respondents were also more likely than boys to desire support, even after adjusting for their level of weight concern.

Interaction analyses revealed that gender strongly moderated the relationship between weight concern and desire for support: the association was notably stronger among girls and gender-diverse young people compared with boys. In contrast, the association was weaker among adolescents of Black, Arab, and Other ethnicities, as well as those who did not disclose their ethnicity. Similarly, a weaker relationship between weight

concern and desire for support was observed among students in Year 13 and those living in the most deprived areas. Together, these findings highlight complex demographic differences in how weight concern translates into a desire for weight management support among adolescents.

5.5.2. Comparison to the wider literature

This analysis seeks to address a key evidence gap on adolescents' support preferences, and comparative literature is limited.

The strong relationship between girls and increased weight concern is well documented however less is known about the relationship between weight concern and gender minority young people.^{58,185,223} A recent review found no strong evidence linking higher weight status and gender minority status; however, it noted that hormone therapy among gender minority individuals is often associated with weight gain.²³⁴ Emerging evidence also suggests that gender minority adolescents experience greater body image dissatisfaction and higher rates of disordered eating than cisgender girls²³⁵ and, while these concerns may have roots beyond weight, such as gender expression and concerns around pubertal maturation, research shows that weight is often intrinsically associated with gender identity and affirmation.²³⁶ Given some of the finding around the intersection of gender identity with mental health and disordered eating in the adult population, more research should be done to confirm if these findings hold true in young people.²³⁷

The wording of the question, which referred to concerns about “weight or shape”, may also have influenced responses among gender-diverse young people. In some cases, participants may have responded positively due to distress or discomfort relating

primarily to body shape, gender expression, or gender dysphoria, rather than concerns specifically related to body weight or adiposity.

Girls, gender minority, and gender diverse adolescents were more likely to express a desire for weight loss support. This finding appears to be closely associated with higher levels of weight concern in these groups. However, given that boys typically exhibit higher rates of overweight and obesity than girls⁹, the observed differences in support-seeking are unlikely to be explained by weight status. Previous studies have reported that girls are generally more likely than boys to perceive and report concerns about increased weight.²³⁸ However, girls are also disproportionately affected by eating disorders and disordered eating behaviours, suggesting that weight concern may not solely reflect concerns related to overweight or obesity. In some cases, elevated weight concern may instead be indicative of underlying disordered eating or body image difficulties, which can be associated with both underweight and overweight presentations.

Participants who reported weight concern had twelve times higher odds of desiring weight-related support. In the main effects model, girls and gender non-disclosing young people were significantly more likely than boys to desire weight support.

However, after accounting for weight concern, girls were only slightly more likely to desire weight support than boys, suggesting that weight concern is the major explaining factor in why girls are more likely to desire weight support. This is not surprising given the extensive literature on high levels of weight concern in girls.^{58,185,223}

This analysis found that weight concern increased with both age and socioeconomic deprivation—patterns that reflect established trends in adolescent weight status.⁹

However, weight concern was highest among adolescents from White ethnic backgrounds, despite national data indicating that young people from these groups have the lowest prevalence of overweight and obesity by ethnicity.⁹ The relationship between ethnicity and weight concern in adolescence remains poorly understood, with existing literature offering inconsistent and sometimes contradictory findings.^{239,240} This highlights the need for further research to explore how cultural norms, body image ideals, and perceptions of weight intersect across different ethnic groups.

Previous research indicates that self-reported dieting is more common among girls and increases with age, aligning with the trends observed in this analysis regarding the desire for weight support.^{241-243 244,245} Similar studies have also found that weight loss attempts are more frequent among individuals from more deprived backgrounds and ethnic minority groups.²⁴⁶⁻²⁴⁸ My analysis found no differences in the desire for weight loss support between ethnic groups and in fact, the interaction model showed that the relationship between weight concern and desire for weight support was strongest in adolescents of White ethnicity. Participants from more deprived backgrounds had higher levels of weight concern but in the interaction model the relationship between weight concern and weight support was mixed. This may suggest that young people from ethnic minority backgrounds or high-deprivation areas may be more likely to attempt weight loss independently rather than seeking support. Additionally, given that weight tends to be higher among individuals from more socially deprived backgrounds,⁹ and I observed no corresponding increase in the desire for weight support with greater deprivation, it suggests that for this sample, the desire for weight support may not be correlated with weight status.

The analysis found that for the oldest age group, year 13, weight concern was negatively correlated with a desire for weight support. This is not something that has previously been reported and may be driven by increased autonomy or previous negative experiences with healthcare.

Across ethnic groups, distinct patterns emerged in both the overall likelihood of desiring weight support and the extent to which weight concern predicted this desire. In the main-effects model, adolescents of Black ethnicity were significantly more likely than their White peers to want support, even after adjusting for weight concern and other demographics, with a similar but borderline finding for Arab adolescents. However, the interaction analyses revealed that the strength of the association between weight concern and desire for weight support was significantly weaker among Black, Arab, Other, and non-disclosing ethnic groups compared with White adolescents. This indicates that, although some minority ethnic groups expressed a higher overall desire for support, their help-seeking was less strongly driven by personal weight concern. This marries with current literature which suggests that different underlying motivations or contextual factors may influence support-seeking in minority ethnic groups.^{249,250} This pattern may also reflect the particularly high levels of weight concern observed among White adolescents, which could amplify the concern–support relationship in this group relative to others.

Adolescents from the most deprived backgrounds showed both higher levels of weight concern and a weaker link between concern and desire for weight support compared with their more affluent peers. This pattern may reflect lower expectations or confidence in accessing external support, but it is also consistent with well-

documented evidence that young people in deprived areas face greater barriers to health-seeking—such as limited transport, reduced service availability, and longer waiting times—which may weaken the translation of concern into help-seeking behaviour.²⁵¹

5.5.3. Strengths and limitations

A key strength of this study lies in its large and diverse sample. The OxWell Survey is one of the largest school-based wellbeing studies of adolescents in the United Kingdom, capturing data from tens of thousands of pupils across a wide range of geographic regions, school types, and demographic backgrounds. Conducting the survey within schools ensures high participation rates and enables the inclusion of young people from varied social, cultural, and economic contexts, providing a rich and representative picture of adolescent wellbeing. Furthermore, the use of an “opt-out” consent process increases participation among vulnerable and traditionally underrepresented groups who are often missed in studies requiring active parental consent, thereby reducing sampling bias and enhancing the inclusivity and generalisability of the findings.²⁵²

Another strength of this study is the use of a broad wellbeing questionnaire rather than one that focuses specifically on weight. Because weight can be a sensitive and stigmatised topic,^{150,227} particularly during adolescence, and framing these questions within a wider context of general wellbeing likely reduced discomfort among participants. Although not explored within the current study, the breadth of data collected within the OxWell survey presents important opportunities for future research. In particular, further analyses could examine the relationship between weight concern and desire for weight support in the context of neurodiversity, bullying, and

other indicators of social, emotional, and physical wellbeing. The anonymous, school-based format further minimised social desirability bias and encouraged honest and complete responses, allowing young people to disclose their feelings and behaviours more openly than might be possible in clinical or face-to-face research settings. Yet, despite these approaches, evaluation of the OxWell survey responses still shows significantly more non-responses or response inaccuracies on ‘sensitive’ versus ‘non-sensitive’ questions.²⁵³ Although non-identifiable, the sensitive nature of weight concern may have led some participants, particularly those with high levels of concern, to skip or avoid related questions, which may have introduced bias into the results.²⁵³

The way the OxWell Survey approached gender was particularly innovative, enabling a more nuanced and in-depth analysis of outcomes by gender identity. To date, OxWell is the only UK school-based survey to allow participants to self-identify their gender using an open drop-down option rather than restricting responses to binary categories. This approach not only promotes autonomy and inclusivity among participants but also provides valuable insights for researchers and survey designers into how best to capture gender diversity in future population-based studies.²³¹ However, despite recognising the fluidity and non-conformity of gender, the survey design continues to present “male” and “female” as response options. Research in this area highlights that these terms refer to biological sex rather than gender identity, and conflating the two can obscure the intent of the question and the interpretation of responses.²⁵⁴ To enhance clarity and inclusivity, it is recommended that future iterations of the OxWell Survey adopt terminology such as “boy” and “girl,” or potentially “masculine” and “feminine,” when referring to gender categories.²⁵⁴

Despite the large and diverse sample of the OxWell survey, there are some populations excluded from the survey. Young people not present on the day of the survey, children excluded from school, those whose parents chose to opt them out of the survey and those attending special schools were not included in the survey. It is hoped that future iterations of the survey will reach special schools, for children with additional needs, and also Pupil Referral Units, where children who are excluded from mainstream school often attend.

Comparisons with population data indicate that participants from the most socioeconomically deprived backgrounds were under-represented in this study. However, this may partly reflect the way deprivation was measured. In health research, area-based indices such as the UK Index of Multiple Deprivation (IMD) are commonly used to assess socioeconomic status.²⁵⁵ As postcodes were not collected in the OxWell Survey to preserve participant anonymity, this approach could not be applied. Instead, the Wales Young People's Survey on Child and Family Poverty items were used to approximate deprivation; however, this is not a validated measure and may not accurately capture the full extent of socioeconomic disadvantage in the sample.²³³ Future iterations of the survey could consider including a question on parental education level, which serves as a reliable proxy for socioeconomic status while maintaining participant anonymity.²⁵⁶

A further limitation relates to the wording of the survey questions, as I did not have final control over the phrasing of my questions. Consequently, these questions may have been open to varying interpretations by participants. For example, the question relating to "weight or shape concern" may have captured concerns associated with body shape,

gender expression, or body image, rather than concerns specifically related to body weight or adiposity. Similarly, the term “weight support” may have been interpreted broadly and not necessarily as formal clinical or behavioural weight management support; participants may instead have considered wider forms of support such as access to green spaces, opportunities for physical activity, affordable healthy food, or informal social support. This ambiguity may have influenced how participants responded and therefore limits the precision with which the findings can be interpreted. Future research should aim to reduce ambiguity within survey items by using more clearly defined and specific terminology, ideally developed in collaboration with young people to ensure consistent interpretation.

The survey did not collect objective data on participants’ weight status. As such, any interpretation of associations between weight and weight concern is speculative. Data from the National Child Measurement programme provides approximate levels of overweight and obesity, but I cannot draw firm conclusions around how weight status may or may not influence weight concern or desire for support.

The cross-sectional design of this study means that causal relationships cannot be inferred. While associations between weight concern and desire for weight support were observed, it is not possible to determine the directionality of these relationships. Additionally, the items used to assess weight concern and desire for weight support were not taken from previously validated measures. Although these items were developed as part of the OxWell Student Survey to capture relevant constructs, the lack of validation means that their reliability and validity are uncertain, introducing the possibility of measurement bias.

All data in the OxWell Survey were self-reported, which introduces the potential for reporting bias. Adolescents' answers may have been influenced by social desirability or limited self-awareness regarding their weight-related attitudes and behaviours. It is also important to address the distinction between "captive" survey completion and response accuracy. Although administering the survey within a school setting may have increased participation rates by capturing a large number of adolescents in a controlled environment, this does not necessarily guarantee the accuracy or validity of responses. Participants may have experienced survey fatigue, disengagement, distraction, or pressure to complete the questionnaire quickly within the classroom environment, which could have affected the quality of the data collected. Consequently, high completion rates should not be interpreted as equivalent to high-quality or fully accurate self-report data.

Additionally, the survey's considerable length meant that many participants did not complete it in full, leading to missing data—particularly for questions positioned toward the end of the questionnaire. In this analysis, non-respondents were categorised into two distinct groups: those who *saw* the question but chose not to answer, and those who *did not reach* the question at all, as these reflect different underlying processes. Participants who did not see the question were excluded from the analysis. However, because the item on desire for weight support appeared near the end of the survey, a substantial number of respondents were excluded on this basis. Consequently, the findings may not be fully representative of the broader adolescent population.

5.5.4. Implications and further research

This study contributes to the limited evidence base on the intersection between weight concern and the desire for weight management support in adolescence. While there is a growing body of literature examining the causes^{190,226} and consequences^{58,225,257} of weight concern among young people, there remains a notable gap in understanding how best to address and manage these concerns. Weight concern occupies a space between physical and mental health, yet it is often inadequately addressed within either domain, potentially leading to unmet needs in both clinical and educational settings.

Additionally, the findings suggest that weight concern, rather than weight status alone, is a key driver of adolescents' desire for weight management support. This raises important questions about current eligibility criteria for support services, which typically prioritise individuals who are clinically defined as living with overweight or obesity. Broadening access to include those who express significant concern about their weight, regardless of measured weight status, may better align services with the needs and motivations of young people.

This also means that weight management services need to be flexible enough to meet the varying needs of young people presenting for support. Given the complex interplay of socio-demographic factors identified in this study, programmes should incorporate strong cultural competence and sensitivity to differing social and lived experiences. One way to achieve this is through the co-design of interventions with young people themselves, helping to ensure that services are developmentally appropriate and responsive to the demographic, cultural, and social needs of this population.

Adolescence represents an opportune period for interventions, as habits, identities, and health behaviours formed during this stage have lasting consequences for wellbeing and the risk of obesity across the life course. Given the scale of demand, support needs to be made more accessible, routine and embedded within settings where adolescents already spend their time.

Taken together, these findings highlight a critical gap in current provision: weight management services, which are typically restricted to young people with overweight or obesity, are unlikely to meet the needs of those whose primary difficulty is weight concern itself. Because weight concern is a psychological construct that can occur independently of weight status, and was strongly associated with desire for support in this study, there is an urgent need for interventions that explicitly address the mental-health dimensions of body image and weight-related distress.

5.6. Conclusions

This study shows that weight concern is widespread among UK adolescents, especially among girls, gender diverse young people, those from White ethnic backgrounds. About one in three students expressed a desire for weight management support, a need strongly associated with concerns about their weight. Together, these results point to a substantial unmet need within existing service models.

CHAPTER 6: A RANDOMISED FEASIBILITY TRIAL TO ASSESS THE USE OF A DIGITAL INTERVENTION TO TREAT EXCESS WEIGHT IN ADOLESCENCE

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

6.1. Summary

This chapter evaluates the feasibility of using a remote, digital intervention to support adolescents to manage their weight. The intervention aims to be easily accessible, whilst upholding high standards of care for potentially vulnerable children. This chapter looks at the results of the RENEWAL (REthiNking approaches to Excess Weight in AdoLoscents) feasibility trial.

The primary aim was to assess the feasibility of progressing to a full-scale trial, by evaluating key study procedures in relation to pre-specified progression criteria. The secondary aim was to explore preliminary indications of effectiveness through selected efficacy outcomes and to assess the acceptability of the intervention using qualitative feedback from participants.

For this study I recruited 25 adolescents between the ages of 13-17 years with a BMI z-score above the 91st centile. I randomised them 2:1 to either the intervention or the control group (usual care) for 12 weeks. The digital intervention was an app offered by a company called Second Nature providing behaviour and dietary advice under the

guidance of a dietitian. The feasibility outcomes were: engagement (user contact with the intervention), retention (user completion of the intervention) and recruitment (length of time to complete recruitment for the study); process outcomes were also assessed to ensure the study was delivered to plan. Efficacy outcomes included changes in weight, eating behaviours and self-esteem. Participant acceptability and the overall experience of the intervention were assessed through qualitative interviews in a sub-group (n = 8) at the end of the intervention.

Participants used the app on average 19 times each through the course of the intervention meaning the engagement criterion was not satisfied. An average of 1 participant was recruited per month meaning the recruitment criterion was not satisfied and retention was 64% meaning the retention criterion was satisfied only with modifications. Process outcomes showed that fidelity to study procedures was poorly maintained, mainly due to difficulty reaching participants for study visits. Despite the poor outcomes for the feasibility criteria, there was a significantly greater reduction in weight in the intervention group (mean difference = -9.7kg (95 % CI $[-18.3, -1.2]$, $p = .033$) when analysing completers only however, this effect was diminished when analysing on an ITT basis (mean difference = -7.46kg (95 % CI $[-16.6, 1.6]$, $p = .094$). There were no differences in the change in self-esteem or eating behaviour between groups. Exploratory outcomes showed a reasonable level of satisfaction with the intervention amongst participants.

In conclusion, the failure to meet progression criteria and poor study fidelity show that a full RENEWAL trial is not feasible in its current format. However, the intervention showed marked reductions in weight and users found it an acceptable form of weight

management support meaning with a change in study procedures there may still be promise for its use in a larger scale trials with outcomes evaluated over a longer duration.

6.2. Introduction

As discussed in Chapter 1, behavioural weight management interventions (BWMI) are considered the gold standard for treatment of adolescent excess weight.¹ However, evidence for effectiveness is limited, especially under real-world conditions.⁷² Barriers to engagement are both practical, such as time, travel and childcare, as well as belief-based such as not recognising weight as an issue or fear of the psycho-social consequences of attendance.^{98,103}

Digital health interventions show promise in supporting health behaviour change in children and young people and are emerging as a promising area in obesity treatment.^{118,119,121} By removing the need to travel and allowing flexible, on-demand access, they have the potential to overcome some of the accessibility barriers associated with traditional weight management programmes and are associated with increased engagement and reduced intervention attrition rates.^{120,258} The private nature of digital interventions also allows participants to engage without the stigma and shame often involved with attending in-person weight management programmes.²⁵⁹ However, evidence for their effectiveness in treating excess weight, specifically among young people, remains limited. My reading found not a single UK based RCT assessing their use with most of the current studies being done in the United States.¹²⁷

While the precise definition of a feasibility trial is debated between sources, it is generally understood to be a piece of research done before a main study to answer the

question “Can this study be done?”.²⁶⁰ Before embarking on a large-scale definitive trial NIHR and MRC guidance recommend a feasibility study to assess whether the trial can be delivered as intended.^{260,261} By running a trial on a much smaller scale first, researchers can change trial processes and address shortcomings as well as assessing potential implementation barriers before embarking on a costly effectiveness trial.²⁶¹ Additionally, by using a mix of quantitative, qualitative and process outcomes to inform evaluation it is more likely to produce meaningful and usable data to inform any future trials.¹¹⁶

REthiNking approaches to Excess Weight in AdoLoscents (RENEWAL) is a study designed to assess the feasibility of using a digital weight management app for treating excess weight in adolescents against pre-specified progression criteria related to key study procedures. The secondary aim was to explore preliminary indications of effectiveness through selected efficacy outcomes and to assess the acceptability of the intervention using qualitative feedback from participants.

6.3. Methods

6.3.1. Study design

This study is a non-blinded, 2-arm, randomised, controlled feasibility trial designed to test the feasibility of progressing to a full-scale trial. The secondary aim was to explore preliminary indications of effectiveness through selected efficacy outcomes and to assess the acceptability of the intervention using qualitative feedback from participants.

The trial assessed the feasibility of testing a digital app for use in adolescent obesity treatment versus the control, a one-to-one with a dietitian. The trial took place between

March 2023 and July 2025. Participation lasted for the 12 weeks and the intervention ceased at the end of the trial. The trial was approved by the NHS Research Ethics Committee (22/NS/0143) and reported in accordance with the CONSORT guidelines for reporting randomised pilot and feasibility trials.²⁶²

6.3.1.1. Recruitment

Participants were recruited through health care professionals in three NHS Trusts in England and six GP surgeries in Wales. Recruiters were asked to identify and refer eligible participants known to them or presenting to them during the study period. They were also provided with study material, including fliers, and posters, and a comprehensive list of inclusion and exclusion criteria to support the referral process. Participants were informed of the study by their health care professional and asked if they would like to be referred for weight management support. Referrers were asked to explain the study purpose and procedures to those young people who were interested in the study and conduct an initial eligibility check by assessing participants' height and weight. Interested participants who appeared eligible were referred to the study with the participant's verbal consent.

6.3.1.2. Screening, Consent and Baseline Assessment

When referrals were received, I emailed each participant with a study information sheet (**Appendix 6.1**) and booked them into a virtual baseline assessment to answer questions and confirm eligibility. As a Health and Care Professionals Council (HCPC) registered dietitian with over 15 years' experience in paediatric weight management, I acted as the study dietitian and was able to screen participant and confirm eligibility. During the virtual baseline assessment, I confirmed date of birth to ensure age was

within the inclusion parameters. If weight and height were provided by the referring health professional, these were orally confirmed with the participant. If no weight and height were provided, participants were asked to take these measurements themselves and send the results photographically to the study team. If participants did not have scales, scales were provided through the post. Weight and height were then used to confirm that the participant met the BMI eligibility requirements. Grasp of the English language, absence of any mental or physical illness that would exclude them from the study and access to a smart device were all confirmed through oral interview with the participant or their parents. Demographic details such as postcode, ethnicity and gender were also collected. If deemed eligible, participant's written informed consent was sought from the parents, with written assent sought from the participants; children over the age of sixteen were considered competent youths and able to consent for themselves

A full list of participant eligibility criteria is detailed in **table 6.1**.

Table 6.1: Study inclusion and exclusion criteria

Study Inclusion Criteria	Study Exclusion Criteria
Young people aged 13-17 years living in the United Kingdom BMI z-score $\geq$ 91st centile for BMI using the UK 1990 growth reference. Has access to an appropriate device to install and use the app.	Young people with a mental illness, significant mental health problem or learning delay that would interfere with adherence to the intervention or trial protocol Young people with any other illness that would interfere with adherence to the intervention or trial protocol.

	Young people who do not have sufficient command of the English language to read and understand the patient information sheet
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Participants in both the intervention and control arms were then asked to complete baseline questionnaires. These were the Adolescent Food Habits Checklist (AFHC) and the Adult Eating Behaviours Questionnaire (A-EBQ) to assess diet, and the Rosenberg self-esteem scale to assess self-esteem.²⁶³ These were then readministered at 12-weeks, which coincided with the end of the intervention. **Table 6.2** outlines the study procedures.

Table 6.2: Study Procedures

Type of visit/Session/Action						
	Initial Eligibility Check	Baseline Assessment	Dietitian Check-in #1	Dietitian Check-in #2	Post-intervention Assessment	Qualitative Interviews
Time point from baseline	Pre-baseline	Week 0	Week 3	Week 7	Week 12	Post-intervention
Duration of session	10 minutes	30-40min	15min	15min	20min	30-60min
Person Conducting Session	Chief Investigator	Chief Investigator	Chief Investigator	Chief Investigator	Chief Investigator	Chief Investigator
Intervention Group	X	X	X	X	X	X
Control Group	X	X			X	
Procedures						
Eligibility Assessment	X	X				

Informed Consent		X				
Randomisation		X				
Virtual Check-in			X	X		
Qualitative Interviews						X
Assessments (all participants unless otherwise specified)						
Weight	X	X			X	
Height	X	X			X	
BMI Calculation	X	X			X	
Socio-Demographic Data		X				
Physical Activity		Self-monitored during intervention period (intervention only)				
Eating Behaviours		X			X	
Dietary Intake		X			X	
Self-Esteem		X			X	

6.3.1.3. Randomisation

Once eligibility checks were confirmed, and before completing baseline assessments, all eligible participants were randomised by an independent member of the study team to either the intervention or control arm in a 2:1 allocation ratio. An unequal randomisation of 2:1 was chosen to derive feedback and results of delivering the intervention to more participants. Randomisation followed a partial minimisation

procedure, a method commonly used in small feasibility trials to reduce baseline imbalance across groups.²⁶² The minimisation algorithm balanced two key prognostic variables—gender and area-level deprivation, the latter derived from the Index of Multiple Deprivation using participant postcode —ensuring comparability of these characteristics between trial arms. Allocation was generated via a secure, web-based minimisation tool (minitable.jar), which provided real-time assignment while maintaining allocation concealment up to the point of randomisation.

Given the nature of the intervention, blinding of neither participants nor myself was feasible. While lack of blinding may introduce performance or detection bias, this approach is typical and acceptable for feasibility studies, where the primary aim is to assess recruitment, retention, and acceptability rather than to draw conclusions about efficacy.²⁶²

6.3.2. Description of intervention

The core intervention was a 12-week digital intervention delivered through an online app. During the intervention, participants met virtually with myself, as the study dietitian, at week 3 and week 7 for a mini check-in to review the participants' progress, provide support and answer any questions.

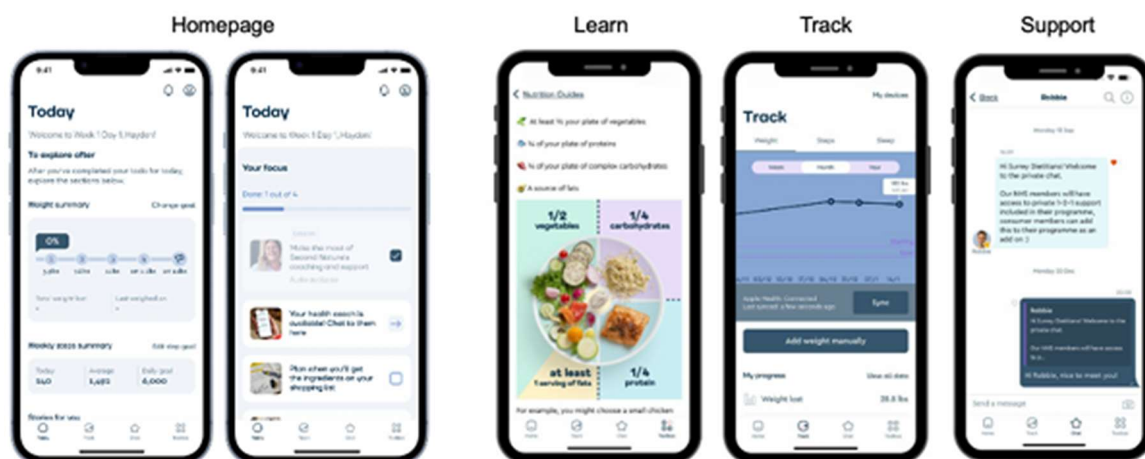


Figure 6.1: Example content for the Second Nature app. Reproduced with permission from Second Nature

The application (app) that was used for this intervention was the Second Nature app.

The Second Nature programme was developed by registered dietitians, nutritionists and exercise specialists and is based on current evidence and best practice guidelines for weight management. It was originally designed to promote weight loss in adults with excess weight and is regularly used in NHS settings. However, for the purposes of this study, it was trialled for use in adolescents with overweight and obesity, the first time it has ever been used in children and young people.

The Second Nature app was selected for this study following an extensive review of available digital weight management tools. Despite increasing interest in digital interventions, no evidence-based app designed specifically for adolescents was identified that adequately met the needs of this population. Discussions were held with Weight Watchers regarding the Kurbo app; however, it was considered culturally inappropriate for a UK population and the required adaptations could not be implemented. Public Health England (now the UK Health Security Agency) and Slimming World were also approached, as both were developing youth focused digital

interventions at the time, but neither had progressed to a usable product. Oviva, a commercial provider of digital weight management programmes, was similarly unable to offer an adolescent specific app and could not provide access to the adult platform free of charge.

Although the use of an adult platform was not ideal, Second Nature offered an evidence-based programme with structured behaviour change content that, following detailed review by myself as a specialist paediatric dietitian, was judged to be appropriate and safe for adolescent users. The existing collaboration between Second Nature and my research team facilitated this choice, and I undertook full onboarding and internal training with the company, enabling me to deliver the intervention in the role of dietitian, given that none of the in house Second Nature practitioners had paediatric expertise.

The app itself has 3 main components as described below:

1. Tracking Function

The app allows participants to track weight, steps and sleep. These can either be entered manually or can sync up to your Apple health app if using an iPhone.

Participants can work with the study dietitian (myself) to support goal setting in each area and these goals can then be entered into the app and tracked.

2. Support Function

This involves a chat room with other study participants and a study dietitian.

Participants use this chat function to share progress, ask questions and provide peer-to-peer support. Participants can also have 1:1 conversations with the dietitian (myself) through direct messaging.

3. Learn Function

The app contains a “toolbox” full of resources designed to support participants throughout the intervention. The resources include the following:

Articles and podcasts containing advice, tips and knowledge on adopting and maintaining health behaviours and why this is important.	Exercise videos ranging from Pilates and yoga to HIIT to dance	Healthy recipes
In-built meal planning tool with link to recipes and shopping lists	In-built journal to write thoughts and feelings on progress and set-backs	In-built food diary should participants wish to track their daily meals and snacks

The app also supports participants through a 12-week programme with a new topic suggested each week as detailed in **Table 6.3**.

Table 6.3: Weekly programme topics in Second Nature app

Week	Topic	Description
1	Reset your lifestyle	Introduction to the programme, goal setting and healthy habits.
2	Nutrition: Focus on meal planning	Encourages participants to think about what they will eat in the coming week; addresses common diet myths.
3	Mindset: Develop a positive mindset	Explores how thoughts and feelings can affect food choices; introduces mindfulness and emotional eating.

4	Exercise: Increase your steps	Sets the foundations of exercise including setting achievable goals, benefits and motivational strategies.
5	Sleep: Establish good sleep routines	Explores the impact of sleep deprivation and changes that can be made to improve sleep quality
6	Stress: Start deep breathing	Discusses the impact of stress on the mind and body and strategies to better control our response to stress.
7	Nutrition: Focus on eating habits	Builds on the core concepts in week 2 including trouble shooting food dilemmas and dealing with cravings.
8	Mindset: Overcome obstacles	Explores topics such as daily gratitude, body image and the importance of learning from setbacks.
9	Exercise: Introduce high intensity exercise	Introduces additional opportunities for exercise and explores how to stay motivated in the long term.
10	Sleep: Improve your sleep quality	Discusses strategies to improve the overall quality of sleep and explores the relationship between sleep and exercise.
11	Stress: Reduce chronic stress	Explores strategies for reducing stress alongside how to prioritise your own mental health.
12	Moving Forward	Discusses ways to maintain healthy habits and the importance of reflecting on your journey thus far.

Dietary Component

The app promotes the following nutrition advice.

1. Have a maximum of 3 servings of complex carbohydrates per day
2. Have a maximum of 2 servings of fruit per day
3. Have one meal free from complex carbohydrates per day

4. Avoid ultra-processed foods and items high in sugar
5. Try to drink at least 2 litres of water per day.

Additionally, the app advises a diet high in non-starchy vegetables, lean protein sources and healthy fats. Calorie counting is not recommended and instead users are advised to have regular meals and snacks and listen to internal hunger and fullness signals.

Whilst these guidelines are consistent with NHS advice for a healthy diet in adolescents, the dietitian was also on hand to adjust the dietary components if required. The app also has a menu planning function and a food journal.

Physical Activity Component

The physical activity promoted through the app is mostly in the form of encouraging daily steps either through walking, jogging or running. However, there is also an exercise resource within the toolkit which has links to various exercise videos including Pilates, interval training, yoga and more; all are judged suitable for adolescents by the Second Nature health care professionals.

Behavioural Component

The behavioural component of the intervention has been informed by behavioural frameworks aiming to promote successful behaviour change. These include:

- The Capability, Opportunity, and Motivation- Behavioural model (COM-B)²⁶⁴
- Theoretical Domains Framework (TDF)²⁶⁵ and
- Behaviour Change Wheel (BCW)²⁶⁶

Within these frameworks, physical and psychological capability (C), environmental and social opportunity (O), and reflective and automatic motivation (M) give rise to behaviour (B).

The **Table 6.4** describes how these models work together to inform the intervention.

Table 6.4: Behaviour change components of the Second Nature app

COM-B Area		Theoretical Domain	App Component
Capability		Knowledge & Understanding	Education Articles
		Skills	Menu Planning Exercise Videos
Opportunity		Social Influences	Chat Function
		Support	Dietitian Messaging & Check-ins Chat Function
Motivation		Confidence regarding capabilities	Exercise Videos Healthy Recipes
		Intentions & Plans	Goal Setting Tracking

6.3.3. Description of comparators

Participants randomised to the control group received a 30-60min 1:1 with myself, as the study dietitian. This comparator was chosen as it represents basic usual care. I worked together with participants to suggest healthy behaviour changes and set SMART goals for the participant to work on. The control group had no further intervention.

6.3.4. Outcomes

6.3.4.1. Feasibility Outcomes

Feasibility of the intervention was assessed across three key domains: recruitment (the time required to identify and enrol the target sample), engagement (the extent to which participants interacted with the digital intervention), and retention (the proportion of participants who remained in the study and completed post-intervention measures). To guide interpretation, I applied predefined progression criteria—classified as *green* (proceed to a full trial), *amber* (proceed with modifications), or *red* (do not proceed)—to determine whether the study should advance to a full-scale RCT. These thresholds were informed by previous feasibility and pilot trial literature outlining the minimum conditions required to justify progression to a larger trial.

Table 6.5: Feasibility outcomes progression criteria

Criteria	Measurement	Indication of Success
Recruitment to the study	Mean number of people recruited per month during the recruitment phase of the study	Mean >4 participants per month
		Mean of 2-4 participants per month
		Mean of <2 participants per month
Engagement with the App	Mean number of contact points with the app over the course of the intervention*	Mean of >42 contact points
		Mean of 21-42 contact points

		Mean of <21 contact points
Retention on the study	Percentage of participants who attended their 12-week post intervention appointment	>70% completing the 12-week measures
		50-70% completing the 12-week measures
		<50% completing the 12-week measures

* contact point is any time they use the app

6.3.4.2. Efficacy Outcomes

The study also assessed the impact of the intervention using the following outcomes with measurements at baseline and follow-up:

1. BMI z-score

BMI z-score was measured by calculating the participant BMI from their weight and height and then using gender and age to plot it on the UK 1990 growth charts.⁴ Weight and height were measured at baseline and 12 weeks by either the referring body or the participant, who then sent a photo of the weigh scales to the study team. However, post-intervention height measurements were frequently self-reported and, in some cases, baseline height was carried forward due to missing data. Given the potential inaccuracy of follow-up height, changes in weight alone were also analysed as a secondary outcome to provide a more reliable indicator of intervention-associated weight change.

2. Eating behaviours

Two questionnaires were used to assess eating behaviours: the Adult Eating Behaviours Questionnaire (A-EBQ) and the Adolescent Food Habits checklist (AFHC) (**Appendix 6.2**). Questionnaires were administered online through Microsoft forms. A link was emailed to participants pre and post intervention so they could access and complete the forms.

The A-EBQ is a 35-item questionnaire looking at food approach behaviours such as food enjoyment and hunger, and food avoidant behaviours such as satiety responsiveness and selective eating.²⁶⁷ Questions are answered on a Likert scale as strongly disagree, disagree, neither agree nor disagree, agree or strongly agree with one score given for strongly disagree and five for strongly agree. Answers are then totalled, total scores ranging from 35 to 175, and any pre/post differences recorded. This questionnaire is validated for use in ages 13+ and was chosen because it assesses common habits seen with excess weight, including emotional overeating and selective eating.²⁶⁷ Emotional eating is also reflective of disordered eating and was intended to signal negative impacts on mental wellbeing.

The AFHC is a 46- item questionnaire looking at health and unhealthy eating habits such as snacking, fruit intake and intake of puddings. It is designed to reflect situations adolescents may find themselves in where they have some level of autonomy to change their behaviour.²⁶⁸ Questions are answered as true or false with one point given for every “healthy” answer; total scores range from 0 to 46. The questionnaire was chosen because it is one of the only eating behaviour questionnaires validated for use in adolescents.²⁶⁸

3. Physical Activity

Physical activity was measured through the tracking function in the app with steps in the first week compared to steps in the last week.

4. Self-Esteem

Self-esteem was measured using the Rosenberg Self-Esteem Scale (**Appendix 6.2**) to assess changes in mental health from the intervention. This scale is a ten-item questionnaire where statements are marked as either strongly agree, agree, disagree or strongly disagree. It was originally designed for use in adolescence and is therefore validated for this population.²⁶³

6.3.4.3. *Process and Exploratory Outcomes*

The following process outcomes were used to assess whether the intervention was delivered as planned:

1. Proportion of dietitian check-ins delivered to schedule
2. Proportion of participants being assessed before starting and within one week of completing the intervention
3. Proportion of participants who are eligible for the intervention agreeing to take part

The study also assessed participant acceptability and overall experience of the intervention and barriers and facilitators of adherence through qualitative interviews. Interviews were conducted over the phone with all the participants in the intervention group invited to take part. Interview topics included:

- The participants' ideas, perspectives and experience of the study,

- Feedback on using the app, virtual 1:1s and the resources provided
- The impact (if any) that the programme had on their lifestyle habits.
- Any recommendations on changes to be made to the intervention to encourage adherence or behaviour change

All qualitative interviews were audio-recorded, transcribed verbatim and analysed using content analysis. Content analysis was used instead of thematic analysis because the aim was to categorise and quantify participants' views on different aspects of the app and study procedures, rather than to explore deeper meanings or interpret underlying experiences.²⁶⁹ Interviews were analysed in 4 different areas:

- Experience of the study and study procedures
- Feedback on the app itself
- The impact (if any) that the programme had on their lifestyle habits.
- Any recommendations on changes to be made to the intervention to encourage adherence or behaviour change.

6.3.5. Statistics and analysis

6.3.5.1. Definition of population for analysis

Feasibility outcomes were analysed using an intention-to-treat (ITT) approach, meaning that all participants were included according to the trial arm to which they were originally allocated, regardless of whether they completed the intervention.

Efficacy outcomes were primarily analysed using a completer-only approach, as paired baseline and post-intervention measurements were required. To evaluate the sensitivity of the results to assumptions about missing data, a secondary intention-to-treat (ITT) analysis was conducted using last observation carried forward (LOCF) for participants

with missing follow-up data. This allowed assessment of the robustness of the primary findings to alternative imputation assumptions whilst acknowledging the limitations of the LOCF method.

6.3.5.2. *Sample size*

As this was a feasibility study, it was not powered to detect a statistically significant difference in efficacy between the arms. In determining thresholds for progression criteria, based on previous trials of a similar nature, I expect at least 70% of participants to complete the study. If so, a sample of 30 would mean that the 95% CI would exclude 50% with a 2:1 intervention:control allocation and therefore I set this as the progression criterion for retention.

I originally planned to randomise 20 participants to the intervention arm, allowing for 30% attrition and yielding an effective sample of approximately 14 participants for engagement outcomes. Assuming a standard deviation of 24 and a target mean engagement of 50 contacts, this sample size would yield a 95% confidence interval of approximately 37–63 contacts. Thus, while the point estimate could lie within the predefined 'green' feasibility threshold (≥ 42 contacts), the confidence interval would be relatively wide and would still include values below this threshold. This level of precision is appropriate for a feasibility study but would need to be improved in a definitive trial.

The progression criteria for recruitment was set at 4 participants per month as this would mean recruiting to the target of 30 participants within 8 months which is a reasonable time frame for this small feasibility study.

6.3.5.3. *Participant characteristics*

Frequencies (with percentages) for binary and categorical variables, and means (with standard deviations) for continuous variables were reported on for the following baseline data:

- Age
- Gender
- BMI z-score
- Ethnicity
- Level of Deprivation

6.3.5.4. *Outcome measure analysis*

Feasibility criteria and process outcomes were analysed and presented as descriptive statistics using data from all participants enrolled in the trial. Feasibility criteria were then measured against the pre-determined progression criteria.

Weight change was primarily analysed using change in BMI z-score. However, given the limited change in height over the short follow-up period together with presumed matching with the comparator group and the potential for measurement error in self-reported post-intervention height, changes in body weight alone were also analysed as a secondary outcome. This additional analysis was undertaken to provide a more robust assessment of intervention-associated weight change.

Eating behaviours were measured by scoring the Adult Eating Behaviours Questionnaire and Adolescent Food Habits checklist in accordance with scoring guidance. The Adult Eating Behaviour Questionnaire was presented overall and in its subscales measuring food avoidant behaviours (slowness in eating, satiety responsiveness, emotional

undereating and food fussiness) and food approach behaviours (food enjoyment, hunger, emotional overeating and food responsiveness). For each questionnaire, change was calculated by subtracting the pre-intervention score from the post-intervention score and then the difference in change between arms was calculated along with 95% confidence intervals using a paired t-test calculation.

Change in self-esteem was calculated by subtracting each participant's pre-intervention Rosenberg Self-Esteem Scale score from their post-intervention score, with higher scores indicating higher self-esteem. These change scores were then analysed using a paired t-test to assess within-arm and between-arm differences with corresponding 95% confidence intervals.

Between-group differences in weight, diet and self-esteem were originally intended to be analysed using an ANCOVA-style linear regression model adjusted for baseline weight and relevant demographic variables. However, the sample available was extremely small ($n < 10$ per arm), meaning that this approach was not feasible or desirable. Therefore, a simpler and statistically appropriate approach was adopted.

Individual change scores were calculated as post-intervention minus baseline, and between-group differences in change were examined using an independent-samples t-test. The aim was not to draw conclusions on differences between arms but to present indicative data.

Acceptability was assessed through qualitative interviews with participants following the intervention. Interviews were audio-recorded, transcribed verbatim, and analysed using content analysis to identify and quantify key views on the intervention's usability, relevance, and overall experience. Findings were summarised descriptively to provide

an overview of participants' perceptions and to highlight aspects of the programme that were well-received or in need of refinement.

6.3.6. Trial management

6.3.6.1. *Data management*

All members of the study team and any NHS staff involved in the study or care of the participants, had to comply with the Data Protection Act 2018, UK General Data Protection Regulation and the NHS Code of Confidentiality. All electronic data entries complied with good clinical practices and standard operating procedures were maintained. Limited personal data was shared with the intervention providers Second Nature, only as was required for them to deliver the intervention to relevant participants. Second Nature have completed the University Third Party Security assessment and, as the app was already approved for use within the NHS and in other studies within University of Oxford, they were already security compliant with University and NHS protocols.

The qualitative interview sessions were audio-recorded and kept securely in a password-protected University server. They were transcribed by the lead researcher and transcriptions were pseudonymised using the participant ID number. Following transcription, the original audio-recording were deleted and pseudonymised transcriptions were securely stored in a password-protected University server.

6.3.6.2. *Ethics*

The study was sponsored by the University of Oxford and received ethical approval by the NHS Research Ethics Committee (ref: 22/NS/0143). Any substantial changes to the

protocol were submitted as an amendment to the ethics committee and the Sponsor.

The trial was also registered with ISRCTN (ref: ISRCTN17811210).

6.4. Results

6.4.1. Participants and recruitment

6.4.1.1. Recruitment

Recruitment required a sustained, multi-faceted strategy and proved considerably more challenging than anticipated. The initial approach focused on engaging three NHS Trusts: Oxford Health NHS Foundation Trust, Oxford University Hospitals NHS Foundation Trust, and Kent Community Health NHS Foundation Trust. Within each organisation, key clinical and managerial stakeholders were identified, including paediatricians, GPs, community paediatric services and staff working in weight management roles. These stakeholders were provided with summary study information and clear referral guidance (**Appendix 6.3**), followed by individual follow-up meetings and telephone discussions to build relationships, clarify eligibility criteria and explore how referrals could best be integrated into existing clinical pathways. Despite this proactive engagement, referrals remained limited.

To increase visibility, the study was presented at multiple professional forums, including Oxford University Hospitals Grand Rounds, the Oxford Health Obesity Task Force meeting, local childhood excess-weight service meetings, and the Kent and Sussex Obesity Research Conference. I also undertook in-person visits to the paediatric teams at the John Radcliffe Hospital, introducing the study face-to-face, discussing referral processes and displaying posters and flyers in relevant clinical areas. To maintain engagement across sites, termly study newsletters were disseminated to stakeholders

(**Appendix 6.4**). These served to reinforce study aims, provide recruitment updates and acknowledge clinicians who had referred participants.

After four months of slow recruitment progress, I extended the study to include 7 GP practices in Wales. Practices were contacted individually, provided with recruitment packs and followed up with personalised communication however, after assurances that they had many young people to refer, only 1 referral from Wales was received.

One year into the study, University Hospitals Bristol and Weston NHS Foundation Trust was added as an additional recruitment site. This organisation has a large and active childhood weight management service, and agreement was reached to allow invitations to be sent to young people currently on the service waiting list who were unlikely to be seen clinically for up to six months. Despite assurances from the service director that success in recruitment could be achieved through this channel, referrals were still very minimal.

Overall, even with extensive relationship-building, repeated engagement, and adaptation of recruitment pathways, recruitment on to this study was still slow and, in the end, the decision was made to stop recruitment early at 25 instead of the intended 30 patients.

Table 6.6 shows the number of participants referred and recruited from each area and specialism.

Table 6.6: Referral sources

Trust	Occupation	Referred	Recruited
Oxford Health	GP	5	0

	Social Worker	3	2
	Dietitian	1	1
Oxford University Hospitals	Health Coach	8	6
	Paediatrician	5	4
	Diabetes Specialist	9	6
	Paediatric Nurse	2	1
Kent Community Health	Public Health Nurse	3	3
University Hospitals Bristol and Weston	Excess Weight Clinic Waitlist	4	1
Wales GP Surgeries	GP	1	1
	TOTAL	41	25

Between March 2023 and February 2025, 41 participants were referred into the trial of which 39 were eligible to take part. Of those, 25 participants (64%) were enrolled and randomised; 17 in the intervention group and 8 in the control group. This was less than my desired sample size of 30 but due to difficulties in recruiting, together with my supervisors, I made the decision to stop recruitment at 25 enrolled participants. Of those randomised, 16 (64%) completed the follow-up; 10 (59%) in the intervention group and 6 (75%) in the control group.

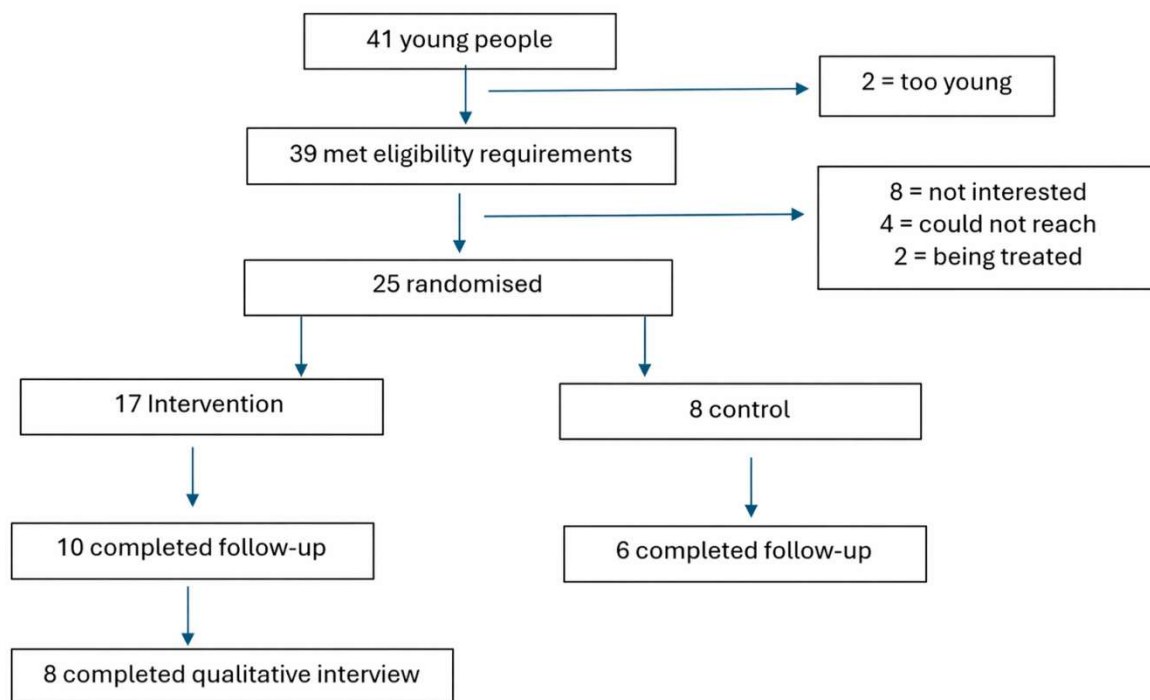


Figure 6.2: Study flow diagram

Table 6.7 shows the participant characteristics for each trial arm. Age, gender, deprivation level and BMI centile were well balanced across both study arms however, the intervention group was much more ethnically diverse than the control group. The intervention group also had 3 children which were under the care of the local authority; the control group had none. There were no participants who actively withdrew from the study, all non-completers were lost to follow-up.

Table 6.7: Baseline characteristics of participants by trial arm

Characteristics	Total (n=25)	Intervention (n=17)	Control (n=8)
Age, years, mean (SD)	14.76 (1.5)	15.11 (1.3)	14.00 (1.6)
Gender, n (%)			
female	12 (48)	8 (47)	4 (50)
Male	13 (52)	9 (53)	4 (50)

Deprivation Decile, Mean (SD)	5 (2)	5 (2)	6.38 (2.88)
Ethnicity, n (%)			
White	15 (60)	8 (47)	7 (88)
Black or Black British	5 (20)	5 (29)	0 (0)
Asian or Asian British	1 (4)	1 (6)	0 (0)
Mixed/multiple/other	4 (16)	3 (18)	1 (12)
BMI z-score, Mean (SD)	3.26 (0.50)	3.33 (0.43)	3.11 (0.61)

6.4.2. Feasibility outcomes

To determine the feasibility of this study in progressing to a full-scale trial specified progression criteria were used. **Table 6.8** shows the outcomes for the progression criteria.

The first outcome, recruitment, proved to be very challenging as described in section 1.4.1 with the study closing early due to poor recruitment. I recruited 25 participants over 23 months for an average of 1.09 participants per month. This is significantly lower than the green progression criterion of greater than 4 participants per month and indicates that a full-scale trial cannot go ahead without adjusting the recruitment mechanism.

The second outcome, engagement, also proved challenging. On average, participants engaged with the app 19 times over the 12-week intervention period, indicated by red on the progression criteria. Only 12% (n=2) of participants engaged with the app greater than 42 times, which was the green progression criteria. The majority of participants, 70% (n=12), used the app less than 21 times over the 12 weeks, indicating the red

progression criteria. **Appendix 6.4** shows the breakdown of the app engagement data from Second Nature.

The third feasibility outcome, retention showed slightly better results. 64% (n=16) of participants completed the study; 75% (n=6) in the control group and 59% (n=10) in the intervention group. This is indicated as Amber on the progression criteria, proceed with modifications. Of the 7 non-completers in the intervention group, 4 didn't even download the app and 1 downloaded it but never opened it.

As two of the three outcomes were red, it is indicated that the study should not proceed to a full trial in its current form.

Table 6.8: Feasibility outcomes and progression criteria

Primary Outcomes	Progression Criteria	Score	Rating	Outcome
Recruitment	Green: >4 participants per month Amber: 2-4 participants per month Red: <2 participants per month	1.09/month	RED	Do not proceed.
Engagement	Green: Total contact with the app >42x Amber: Total contact with the app 21-42x Red: Total contact with the app <21x	Mean (SD) = 19.1 (37.0)	RED	Do not proceed.
Retention	Green: >70% attending 12-week appointment	64%	AMBER	Proceed with modifications.

	Amber: 50-70% attending 12-week appointment Red: <50% attending 12-week appointment			
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6.4.3. Efficacy Outcomes

Changes in BMI z-score, weight, eating behaviours, and self-esteem were examined as measures of intervention effectiveness using both within-group and between-group comparisons. Results are presented for both a completers-only analysis (**table 6.9**) and an intention-to-treat (ITT) analysis (**table 6.10**) using LOCF. As expected, effect sizes were attenuated under ITT assumptions, although the direction of effects remained consistent across both approaches.

Across both the completers-only and intention-to-treat (LOCF) analyses, the intervention demonstrated consistent improvements in weight-related and behavioural outcomes compared with control, although statistical significance was attenuated under the more conservative ITT assumptions.

6.4.4. Anthropometry

For BMI z-score, the intervention group showed a modest reduction in both the completers and ITT analyses, while the control group showed a small increase in both. Between-group differences did not reach statistical significance in either analysis (completers: $p = .135$; ITT: $p = .099$), reflecting limited power.

For body weight, there was evidence of a clinically meaningful and statistically significant reduction in the intervention group relative to controls among completers ($p = .033$). Under ITT assumptions, the intervention effect was attenuated, and the

between-group difference no longer reached statistical significance ($p = .094$), although the direction and magnitude of effect remained consistent.

6.4.4.1. Health behaviours

For eating behaviours, the AFHC showed significant improvements in the intervention group among completers, with a strong between-group difference ($p = .006$). This effect was not sustained under ITT analysis, where both groups showed similar improvements and there was no evidence of a between-group difference ($p = .955$), suggesting sensitivity of this outcome to missing data assumptions.

For the A-EBQ, neither food approach nor food avoidant behaviours showed evidence of between-group differences in either the completers or ITT analyses, although small favourable trends were observed in the intervention group.

I was unable to reliably assess physical activity levels, as use of the activity tracker was inconsistent and engagement with the feature was generally poor. In addition, access to the underlying activity data was not available made available to me, limiting my ability to objectively evaluate changes in physical activity over the course of the intervention.

6.4.4.2. Self-Esteem

For self-esteem, both groups showed modest improvements over time in both analyses, but no statistically significant between-group differences were observed in either completers ($p = .144$) or ITT ($p = .584$), indicating that changes in self-esteem were not clearly attributable to the intervention.

Table 6.9: Efficacy outcomes at 12 weeks for completers only

	Baseline Mean ($\pm$ SD)	12-weeks Mean ($\pm$ SD)	Change at 12 weeks Mean (95% CI)	intervention vs control Mean (95% CI)	P value
BMI z-score					
Intervention (n=10)	3.13 ($\pm$ 0.39)	2.87 ($\pm$ 0.64)	-0.25 (-0.57, 0.06)	-0.50 (-1.23, 0.22)	0.135
Control (n=6)	3.00 ($\pm$ 0.68)	3.12 ($\pm$ 0.66)	0.12 (-0.04, 0.29)		
Weight (kg)					
Intervention (n=10)	92.5 ($\pm$ 9.5)	88.2 ($\pm$ 14.5)	-4.20 (-9.55, 1.15)	-9.7 (-18.3, -1.2)	0.033
Control (n=6)	87.9 ($\pm$ 15.8)	90.8 ($\pm$ 14.7)	2.99 (-0.93, 6.92,)		
Eating Behaviours					
Adolescent Food Habits Checklist					
Intervention (n=10)	9.2 ($\pm$ 4.2)	13.4 ($\pm$ 4.2)	4.2 (0.83, 7.57)	-11.5 (-18.0, -5.0)	0.006
Control (n=6)	12.7 ($\pm$ 2.6)	14.3 ($\pm$ 2.6)	1.67 (-1.70, 5.03)		
Adult Eating Behaviour - Q					
Food Approach Behaviours					

Intervention (n=10)	56.8 ($\pm$ 13.6)	59.2 ($\pm$ 11.7)	2.40 (-2.04, 6.84)	1.00 (-9.2, 11.2)	0.811
Control (n=6)	58.7 ($\pm$ 9.4)	57.5 ($\pm$ 2.9)	-1.17 (-9.52, 7.18)		
Food Avoidant Behaviours					
Intervention (n=10)	46.6 ($\pm$ 9.2)	44.5 ($\pm$ 6.5)	-2.10 (-6.78, 2.58)	-4.00 (-15.0, 7.0)	0.393
Control (n=6)	39.0 ($\pm$ 6.5)	42.5 ($\pm$ 6.7)	3.50 (-3.82, 10.82)		
Self-Esteem (Rosenberg Self Esteem Scale)					
Intervention (n=10)	14.3 ($\pm$ 3.8)	16.0 ($\pm$ 4.8)	1.7 (-1.84, 5.23)	-2.67 (-6.63, 1.30)	0.144
Control (n=6)	17.5 ($\pm$ 4.0)	19.0 ($\pm$ 1.8)	1.5 (-1.30, 4.30)		

Table 6.10: Efficacy outcomes at 12 weeks using ITT analysis

	Baseline Mean ($\pm$ SD)	12-weeks Mean ($\pm$ SD)	Change at 12 weeks Mean (95% CI)	intervention vs control Mean (95% CI)	P value
BMI z-score					
Intervention (n=17)	3.33 ($\pm$ 0.43)	3.18 ($\pm$ 0.64)	-0.15 (-0.33, 0.03)	-0.41 (-0.92, 0.10)	0.099

Control (n=8)	3.11 (± 0.61)	3.20 (± 0.58)	0.09 (-0.03, 0.22)		
Weight (kg)					
Intervention (n=17)	100.52 (± 17.0)	98.0 (± 20.1)	-2.49 (-5.57, 0.58)	-7.46 (-16.56, 1.65)	0.094
Control (n=8)	90.51 (± 15.1)	92.8 (± 13.9)	2.25 (-0.64, 5.14)		
Eating Behaviours					
Adolescent Food Habits Checklist					
Intervention (n=17)	10.23 (± 4.1)	13.64 (± 5.2)	3.41 (1.16, 5.66)	-0.13 (-5.15, 4.90)	0.955
Control (n=8)	13.50 (± 2.7)	16.75 (± 5.0)	3.25 (-0.09, 6.56)		
Adult Eating Behaviour - Q					
Food Approach Behaviours					
Intervention (n=17)	56.18 (± 11.1)	57.82 (± 10.0)	1.65 (-0.81, 4.11)	1.13 (-6.32, 8.57)	0.731
Control (n=8)	58.25 (± 8.0)	57.88 (± 2.5)	-0.38 (-6.13, 5.38)		
Food Avoidant Behaviours					
Intervention (n=17)	47.00 (± 7.6)	45.65 (± 6.1)	-1.35 (-3.92, 1.22)	-3.88 (-11.84, 4.09)	0.288
Control (n=8)	40.50 (± 6.2)	42.88 (± 5.7)	2.38 (-2.85, 7.60)		
Self-Esteem (Rosenberg Self Esteem Scale)					

Intervention (n=17)	14.12 ($\pm$ 3.1)	15.35 ($\pm$ 4.0)	1.24 (-0.72, 3.19)	-1.00 (-5.12, 3.12)	0.584
Control (n=8)	16.88 ($\pm$ 3.6)	18.50 ($\pm$ 1.8)	1.63 (-0.27, 3.52)		

6.4.5. Process outcomes

Process outcomes are summarised in **Table 6.11**. Three process outcomes were evaluated to assess the fidelity to which the intervention was being delivered. The first outcome was whether the dietitian check-ins at 3 and 7 weeks were delivered to schedule. Whilst 53% of the week 3 check-ins were delivered to schedule, only 6% of the week 7 check-ins were, averaging out to 29% of all check-ins delivered on time. The second process outcome was proportion of assessments done before starting and within one week of completing the study. Whilst 100% of the pre-study assessments were done before starting, only 8% were done within one week of completing, averaging out to 54% being delivered on schedule. The third outcome measure was proportion of eligible participants referred who chose to take part in the study. Of the 39 eligible participants, 25 were recruited, reflecting a 64% uptake for the study.

Table 6.11: Process outcomes

Process Outcome	Result
Proportion of dietitian check-ins delivered to schedule at 3 and 7 weeks	3 weeks = 9 of 17 (53%) 7 weeks = 1 of 17 (6%) Total = 10 of 34 (29%)
Proportion of assessments done before starting and within 1 week of completing	Before starting = 25 of 25 (100%) Within 1 week of completing = 2 of 25 (8%) Total = 27 of 50 (54%)

Proportion of participants participating that were eligible for the study	25 of 39 = 64%
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6.4.6. Exploratory outcomes

Of the 10 participants that completed the intervention, 8 completed a follow-up interview to assess views on the intervention and study procedures. Interviews were short, taking an average of 6min34sec (SD = 2m16s) length. The shortest interview was 3min22sec and the longest was 9min57sec. Views are summarised below.

Experience of the study and study procedures

Participants reported that the study procedures were easy to understand and that support from the research team was adequate. They felt the online questionnaires were easy to navigate and complete and reported no major issues in downloading the app. However, during the study participants often missed the deadline to complete procedures or sign-up to the app indicating that, although it was easy, it was either not prioritised or forgotten about. When asked if they would prefer a face-to-face intervention, all the participants said they preferred virtual with only one participant saying it would have been nice to meet in person once to put faces to names. One participant stated it was nice to do things “from the comfort of your own home”.

Feedback on the App

Although most participants found the app easy to use, use was low and often sporadic. Reasons for not using the app included feelings that it was boring, confusing or that they just got busy and forgot about it. Two participants recommended incorporating notifications so that you would be reminded to use the app and one participant

recommended specifying a target for use because they believed it would mean they would not get lost fumbling around in the different areas of the app with no real direction.

Impact on lifestyle habits

All participants interviewed reported behaviour change that they ascribed to the intervention. Most described walking more and a few described making healthy changes in their eating. Most said they had managed to maintain any changes. Only one participant stated that her family also got involved in the intervention with her mum buying different food and her sister joining her on walks. All other participants stated that they didn't have any family or friend involvement with the intervention.

Recommendations on changes to be made to the Intervention

Track: Participants reported using the tracking function far more frequently than any other feature of the app, a pattern that was confirmed by the usage data provided by Second Nature. Although the data did not specify what participants were tracking—only the number of tracking events—only one participant recorded their weight, suggesting that most tracking activity related to steps or sleep. Several participants said they enjoyed monitoring their steps, while others highlighted opportunities for improvement. One participant noted that automatic syncing with home scales or wearable devices would make tracking easier, and another reported that the food tracking feature felt too difficult to use.

Two participants mentioned that they thought it would be good to have rewards or badges that you could earn through tracking (i.e.) get 10K steps and get a badge, 10-day

streak and get another, etc. One also mentioned a leaderboard so you could see how you were doing in comparison to the other participants.

Learn: None of the participants used the recipes or the meal planner. One participant said the recipes were too expensive, but all the others just said they weren't interested. Only one participant said they read a couple of the information articles, and one said she watched a couple of the videos. Two participants said they would have preferred short, motivational TikTok style videos to the lengthy, text-heavy articles.

Support: Participants reported enjoying the dietitian's posts in the group chat, however the data shows most participants rarely accessed the group chat. Two participants reported that they liked being able to access support through direct message with the Dietitian "on demand". One participant summed it up by saying "I enjoyed the feeling that if I needed someone to talk to or advice it was generally there. I didn't have to search for an answer or wait to go in and see someone, I could just type it in." That being said only one participant reached out unprompted and only on one occasion.

6.5. Discussion

6.5.1. Principal findings

This chapter presents the results of a feasibility trial to assess the feasibility and acceptability of conducting a large-scale trial of a digital intervention for weight loss in adolescents. The primary outcome showed that the study was not feasible in its current state. Neither engagement nor recruitment met the progression criteria, retention was not adequate and procedures would require modification to progress. However, secondary outcomes showed some promise of a significant and clinically very

meaningful reduction in weight in the intervention group, compared to weight gain among the control group, especially among the subgroup completing the intervention. Process outcomes showed low fidelity to study procedures and exploratory outcomes showed that while participants were generally satisfied with the study procedures and the app, they did not use it as intended and participants suggested improvements.

6.5.2. Comparison to the wider literature

6.5.2.1. Outcome measures

Previous studies examining the impact of mobile apps on weight management in adolescents show mixed results.^{118,119,270} An app-based intervention study conducted in young people showed a steep decline in engagement with less than 50% of participants using the app in week 2 and less than 20% of participants still using the app by 12 weeks.²⁷¹ My study showed very similar results with 47% of participants still engaging with the app at week 2 and 24% at week 12. The participants reported their busy lives, lost passwords, and “just forgetting” as reasons for the decline in app usage. A meta-analysis by Melo et al.²⁷² showed that interventions which incorporated behaviour change techniques were the most effective at maintaining engagement with personalised feedback and gamification showing particular promise. They also recommend engagement strategies be tailored to participant age, with younger adolescents responding well to gamification and older adolescents preferring autonomy supporting strategies.²⁷²

A large co-production study involving adolescents across three European countries, identified several features that young people considered important for mobile weight-management interventions.²⁷³ Adolescents emphasised the need for personalised

interfaces, age-appropriate language, clear goals, engaging reward systems, variation in activities, gamification elements, and opportunities for peer support and social connection.

As the app I used for this study was designed for adults, it contained very few of the features previous literature has demonstrated are helpful to engage teens, such as rewards or gamification, which may have been one of the reasons engagement was poor. Indeed, in the exploratory analysis, several participants said they would have preferred gamification, such as badges and leaderboards, and video content more targeted to adolescents.

Recruitment was challenging for this study. Despite opening the study up in two new areas, recruitment targets were still not met. For this study, the ethics committee insisted that referrals must come through health care professionals yet, in Chapter 4, young people told us that they did not want to visit their GP to discuss weight and they did not want health care providers to raise the issue of weight with them. In fact, only 1 participant in this study was recruited through a GP despite almost 200 GP surgeries included in the recruitment sites. Most participants were recruited through health coaches or diabetes specialists. This may be because health coaches are able to take more time with patients explaining the study and building a relationship. Similarly, diabetes specialists are likely to have a longstanding relationship with the patient where trust has already been established over time and therefore the patient may be more likely to accept referral for weight management from them.

This is corroborated by data from informal discussion with referrers post-study in which they told us that they found it inappropriate to raise weight with young people when it

was not what they were presenting for or when no relationship had been established and, often if they did mention the study, parents and young people became upset or were unaware the child had excess weight. Other research reports the same issue. Syrad et al.¹⁰³ reported that parents were often unaware of their child's weight status and felt that talking about weight will cause anguish to their child.

I recruited from two existing child weight management clinics, Bristol and Oxford. Bristol is much larger and more well established than Oxford however each clinic only referred 4 and 5 patients respectively, despite Bristol recruiting from an existing waitlist. When questioned, both clinics stated that most clinic attendees were under the age of 12 and the number of adolescents presenting to clinic was minimal. However, a recently published audit on CEW clinics showed that the majority of patients were adolescents with 42% in the 15-18 years age bracket.⁷⁵ Future studies may have more success recruiting in other centres.

Additionally, young people were asked to complete an initial assessment over the telephone which is not a medium many young people are comfortable with.²⁷⁴ This may have deterred some interested young people and may also explain why adherence to dietary check-ins, which were also phone-based, was so poor. Exploratory interviews were also conducted by telephone which may explain why the interviews were often brief in duration. A future study may benefit from understanding what methods may be more acceptable to teenagers.

Retention for this study was 64% which was amber in the feasibility criteria. Data on average retention rates for adolescent weight management interventions is mixed with estimates ranging from 40% to 88%.^{270,275} Therefore, it is likely that 64% is an average

retention rate for this type of programme. For digital weight management interventions in adolescents previous research suggests that baseline BMI may have an impact on retention, with higher baseline BMI, and thus higher need, participants more likely to complete the intervention.²⁷⁶ All the participants had baseline BMI above the 99.6th centile and therefore my ability to assess differences in retention based on this were limited.

Process outcomes for this study were poor showing that the study was delivered with the low fidelity to the protocol. Only 29% of Dietitian check-ins and 8% of post-intervention assessments were delivered to schedule. Again, this could be due to the fact that they were conducted by phone which is not a comfortable communication style for many young people.²⁷⁴ Previous research suggests that young people check email infrequently and prefer text messages to phone calls.²⁷⁷ They also stated that they only want to be reminded about appointments a maximum of 3 times after which researchers should assume they are no longer interested.²⁷⁷ Process measures for turnover from referral to recruitment were slightly better at 64% of those eligible taking part. One interesting thing to note is that 18% (n=7) of eligible referrals were looked after children or children we care for (CWCF). This is much higher than the national average of <1%.²⁷⁸ These are often children with complex needs, with many living in residential care or foster homes.²⁷⁹ Whilst 4 CWCF children were randomised to the intervention, none of them completed, meaning that 4 of the 7 non-completers were CWCF children.

6.5.2.2. *Digital intervention components*

Evidence to support the inclusion of specific behavioural components in behavioural weight management apps is limited. A NICE evidence review on weight management in children/adolescents and adults showed that feedback and monitoring, goal setting, and social support were most highly associated with changes in behaviour and that some level of individual tailoring was recommended for maximum effect.¹²¹ This aligns with research from service users who stated that they valued self-monitoring, a sense of connectedness, and the opportunity to learn remotely.¹²²⁻¹²⁴

Data from the intervention arm indicated that the TRACK feature was by far the most frequently used component of the app. Track interactions were defined as the number of times a participant viewed or recorded weight, sleep or step readings. This aligns with existing evidence showing that adolescents are particularly drawn to digital tools that allow them to monitor progress in areas such as physical activity, nutrition, and goal achievement.¹¹⁹ In the exploratory analysis, participants also expressed a desire for additional motivational features, including leaderboards or reward systems such as badges and achievements linked to goal completion. This preference is consistent with the broader literature on adolescent neurodevelopment, which demonstrates heightened sensitivity to reinforcement learning and reward-based feedback during this life stage.^{280,281}

The LEARN function, assessed through the number of articles accessed, was used infrequently in this trial. Although new articles were presented daily and covered a range of health behaviour topics, with both reading and audio options available, engagement was minimal: only two participants accessed more than 20 articles over the 12-week

intervention, while all others accessed between 0 and 2. Interview data corroborated this low usage, with participants reporting that they found the articles too long and insufficiently engaging, expressing a clear preference for short, “TikTok-style” video content. This aligns with emerging evidence suggesting that the widespread consumption of short-form video on social media may be contributing to reduced attention spans among young people.²⁸² It is also unsurprising that adolescents gravitate towards formats that are familiar and consistent with their everyday media use.

The SUPPORT function—measured by the number of messages sent or received in either the private or group chat—was also used infrequently. This is somewhat unexpected given evidence suggesting that encouraging messages, whether from peers or automated app prompts, are key components of successful mHealth interventions for young people.¹¹⁹ One possible explanation is that the intervention groups were too small to foster meaningful group interaction; each included only 2–4 participants, and the sensitive and often stigmatised nature of weight may have inhibited open discussion. Although interview participants reported valuing the posts and supportive messages from the dietitian, app usage data showed low engagement. It is also possible that participants’ positive comments were influenced by social desirability, given that the dietitian who delivered the intervention also conducted the interviews. One potential solution may be to have a more anonymous peer-support model that is more congruent with digital social media patterns. For example, instead of having to write a message, users could “like” posts or give other users a “high five” to show social support without needing to send a written response.

Previous research on digital weight management interventions for young people consistently highlights a positive association between improved outcomes and active parental involvement.^{270,283} In this study, parents were involved only to provide consent for participants under sixteen, with no further engagement in the intervention itself. Incorporating parents more intentionally—whether through supportive messaging, joint goal-setting, or parallel educational content—may therefore represent an opportunity to strengthen outcomes in future designs.

These findings highlight several important considerations for future intervention design. First, the strong engagement with the TRACK feature suggests that progress-monitoring tools should remain central, enhanced with gamified elements such as badges, achievements, and leaderboards to capitalise on adolescents' responsiveness to reward-based feedback. In contrast, the limited use of the LEARN function indicates a need to replace or supplement long-form written content with short-form, visually engaging multimedia that better reflects adolescents' everyday digital consumption patterns. The low engagement with the SUPPORT feature suggests that social components may be more effective if delivered through larger or anonymised peer groups, automated supportive messaging, or moderated forums that reduce self-consciousness and weight-related stigma. More broadly, digital interventions should align with the formats young people naturally use—interactive, brief, and visually stimulating—and may benefit from being embedded within mixed-delivery models that combine digital tracking with optional in-person or virtual support.

6.5.3. Strengths and limitations

A key strength of this study was the diversity of the participant sample. Adolescents were recruited across a broad range of ethnicities, genders, ages, and deprivation levels, enhancing the relevance and transferability of the findings to real-world populations. Young people from ethnic minorities were disproportionately represented in the intervention group but as numbers were small and I didn't include ethnicity in my randomisation criteria this was always a risk.

The intervention itself was theoretically informed and designed to address all core components recommended for behavioural weight management in young people, including nutrition, physical activity, and behaviour change strategies. Additionally, the digital format offered a relatively low-cost and scalable approach, demonstrating potential for wider implementation should effectiveness be established.

A major strength of this study is its comprehensive, mixed-methods design. By examining feasibility, preliminary efficacy, and process outcomes alongside qualitative interview data, the study was able to generate a rich and nuanced understanding of how the intervention functioned in practice.

There were several limitations. Recruitment proved challenging, largely due to the need for referrals through healthcare professionals, which restricted reach and slowed enrolment. Although recruitment was itself an outcome being assessed as part of this feasibility study, the slow pace meant that the planned sample size could not be achieved, even after extending the recruitment period. The requirement for phone or email contact during recruitment and follow-up may also have introduced barriers;

more flexible approaches such as text messaging or voice notes may have improved response rates.

Another limitation of the study is that participants were asked to report their weight instead of it being independently measured and reported. Self-reported weight is prone to both intentional and unintentional error, particularly among adolescents, and this has important implications for interpreting weight change over time.^{284,285} Inconsistent weighing practices, differences between home scales, and recall inaccuracies can introduce random error, making true changes in weight harder to detect. Social desirability bias may also lead some participants to under-report their weight, which can artificially inflate or obscure apparent weight loss. Participants were required to provide photographic evidence of weight in attempt to reduce error and bias however even this has limitations.²⁸⁶ When these errors occur at either baseline or follow-up—or at both—they can distort the magnitude and direction of measured weight change, reducing the reliability and validity of weight-related outcomes.

For my analysis, I looked at both BMI z-score and weight as anthropometric outcomes. Whilst BMI z-score is the gold standard in this age group, as children were self-reporting weight and height there was concern about the accuracy of the self-reported height measures, especially between pre and post intervention heights, and the impact this might have had on accurate BMI z-score reporting. Therefore, I chose to analyse body weight as well as a secondary outcome since changes in height over the short duration of the study are expected to be small and matched across groups.

The study did not reach its intended sample size, which affects the confidence with which conclusions can be drawn. A smaller sample reduces statistical power,

increasing the likelihood of error and making it more difficult to detect true effects. It also results in wider confidence intervals, meaning that the estimates of feasibility, acceptability, and preliminary effectiveness are less precise. As a feasibility study, the sample size shortfall does not undermine the primary aim of assessing processes and identifying barriers; however, it does limit the certainty and generalisability of any conclusions.

The smaller-than-planned sample size also restricted the types of analyses that could be undertaken. With insufficient participants to meet the assumptions of linear regression or to support meaningful subgroup comparisons, it was not possible to examine differences across demographic groups or adjust for potential confounders. As a result, I relied on basic t-tests to assess pre–post changes, which provide a more limited understanding of the data and meant less robust findings.

Nine participants dropped out of the study, meaning a high level of missing data for the efficacy outcomes. For the ITT analysis I chose, with the guidance of my supervisors, to use LOCF for analysis as the best option available. However, this method is not without its limitations with a recent analysis suggesting it leads to questionable or false conclusions.²⁸⁷ By looking at results from both the ITT and completers-only analysis I can see a fairly clear picture of the trends in outcomes however, given the deficiencies in both these methods, drawing overly strong conclusions from the efficacy outcomes must be done with caution.

Furthermore, I used an off-the-shelf app designed for adults. This was the only practicable option within the time and resource constraints of a DPhil. However, it was not optimally designed for adolescents who expressed a preference for gamification,

age-appropriate language, interactive elements, or personalised support. The absence of these features—widely recognised as central to sustaining engagement among younger users—likely contributed to the low levels of app use observed and may have reduced the intervention’s acceptability. This constraint also reduces the relevance and transferability of the intervention-specific findings, as engagement patterns may have been markedly different had the digital tool been designed with adolescents’ developmental needs, media preferences, and motivational drivers in mind.

6.5.4. Implications and further research

This study is one of the first app-based weight management intervention studies to be conducted with young people in the UK. As such, the findings, although limited by size and scope, still provide valuable learning in driving further intervention design and fine-tuning the processes. This study provides preliminary evidence that this type of intervention may be effective and, therefore, it is worth refining the intervention and processes based on the learning from this study, and re-testing feasibility.

The findings from this feasibility study highlight several considerations for a future feasibility study. First, recruitment pathways will require careful design. Reliance on healthcare professionals for recruitment resulted in low reach and slow enrolment, indicating that alternative recruitment strategies may be more effective. Future research should explore approaches such as social media advertising, outreach in youth-centred settings like schools and youth clubs, and enabling young people to self-refer, which may widen access and increase participation.

Methods used to communicate with participants during the study also need to be re-evaluated for any future feasibility trials. Communication methods such as text

messaging, app notifications, or voice notes may be more effective than phone or email contact for engaging young people and improving retention.

While the intervention did prove somewhat effective, refinement of the intervention could be done prior to a future feasibility trial to incorporate some of the user feedback from this study. Adolescent-specific features such as gamification, rewards, challenges, and autonomy-supportive tools should be included in future interventions and could be done through co-design with young people. It would also be worth exploring whether parental involvement improves outcomes, given that parental engagement is consistently linked to success in youth weight management interventions.

Second Nature contacted me to discuss developing an app that is bespoke for young people. Based on the findings in this study, they have asked me to consult with them to help develop a product that is both evidence-based and bespoke to the needs of young people as outlined in this chapter. Ideally, this development process would integrate insights from the current study and the wider literature, adopting a co-creation approach in which young people play an active role in shaping the content, features, and shape user experience. Ongoing user testing throughout the development cycle may improve the final product so that it is more engaging and acceptable to young people.

In summary, while preliminary efficacy outcomes seem to warrant a future feasibility study, recruitment strategies, communication methods and intervention components must first be refined to ensure a more viable study design.

6.6. Conclusions

Findings from this study indicate that limitations in trial procedures, particularly in relation to recruitment pathways, intervention fit for age group, and engagement processes, constrained feasibility in its current form. Future work should prioritise refining recruitment strategies beyond traditional healthcare referral routes, ensuring that digital platforms are co-produced with young people, and incorporating process evaluation to understand patterns of use and engagement. Despite these feasibility challenges, the intervention itself demonstrated some potential as an accessible and scalable approach to supporting adolescents with excess weight. A further feasibility study addressing these procedural elements is warranted before progression to a definitive randomised controlled trial. Such refinement will strengthen the methodological foundation required to determine the true effectiveness of digital interventions in this population.

CHAPTER 7: DISCUSSION

Chapter 1: Introduction
Chapter 2: Aims, Objectives and Methods
Chapter 3: Healthy Eagles Study
Chapter 4: Qualitative Interview Study
Chapter 5: OxWell Survey Evaluation
Chapter 6: Digital Intervention Feasibility Trial
Chapter 7: Discussion

7.1. Summary

This final chapter provides an overview of the key findings and contributions from the studies presented in this thesis and considers them within the wider context of adolescent weight management research. I begin by outlining the principal strengths of the thesis, including its multi method design, its focus on young people’s perspectives, and its emphasis on generating evidence that reflects real world practice rather than controlled trial conditions alone. I then discuss the main limitations of the work, such as challenges with recruitment, reliance on self-reported data, and the constraints inherent in conducting research with adolescent populations. The chapter also reflects on the practical and methodological challenges encountered throughout the DPhil, including issues relating to patient and public involvement, digital intervention development, and the complexities of working with services and external partners. In the final sections, I consider the implications of the findings for practice, policy, and future research, and outline priority areas for further work to improve how adolescents are supported to achieve and maintain a healthy weight.

7.2. Findings and Contributions of this thesis

Chapter 1 provided an overview of the existing literature and established the rationale for the research undertaken in this DPhil. I looked at how adolescents in the UK are currently treated for excess weight. This identified that BWMI were currently the standard option for treatment, however they often performed well in trial conditions yet produced poor outcomes when implemented in real-world settings.⁷² There was a paucity of evidence on why these interventions were failing when delivered at scale and what impact, if any, setting may have on the overall outcomes.

I looked to explore this question further in **Chapter 3** where I evaluated an existing BWMI, the Healthy Eagles programme, that was delivered in both school and community settings, allowing me to directly compare outcomes. In my study, the school programmes performed slightly better than the community programmes however change in BMI across both settings was minimal. The school programme also showed much greater engagement, much lower attrition and was more likely to reach young people from diverse and disadvantaged backgrounds. This is supported by literature suggesting school settings may be better for retention of people from ethnic minorities and those from areas of high deprivation.¹⁴³ The increased retention on the school programme (100% vs 33% for the community programme) may also have led to improved outcomes as hypothesized by previous literature suggesting consistency in attendance is more important than intervention content.¹⁴⁴ School programmes are less expensive to run and, because they are universal, are not often associated with the same stigma that community programmes are.⁶¹ While this study provides evidence that school programmes may be better than community programmes it also supports

the expanding literature that shows BWMI just aren't effective enough to lead to a significant reduction in BMI z-score in young people with obesity, leading me to wonder, if not this, then what?

In **Chapter 4** I aimed to answer this question by interviewing young people and parents on their views around weight and weight management. The idea of this study was to better understand why current weight management options may not be effective and how they felt we could better support young people to achieve a healthy weight. The findings highlighted a perceived lack of support for weight management and barriers to existing weight management programmes were similar to those previously raised in the literature.^{212,288} However, the interviews exposed another side to weight and weight management which was the concept of weight concern and the impact this was having on the lives of young people and their parents. Participants described weight pressure, often as a function of social media, as having a significant impact on their self-esteem and mental health and often leading to dangerous dieting or disordered eating. The relationship between social media and body dissatisfaction is covered extensively in the literature however mostly in adolescent females;¹⁸⁶⁻¹⁸⁸ my research suggested that males were also susceptible. Additionally, parents were generally more concerned about weight concern and weight pressure in their children than any potential physical risks associated with excess weight. There is some evidence in the literature of the value parents place on happiness above weight status, however the deep concerns parents voiced in this study around weight pressure is a relatively new and emerging concept.¹⁰³ Also, while the associations participants described between weight concern and mental health are well documented, the deeper associations to disordered eating and clinical eating disorders are less well researched.^{59,185}

The pervasive narratives around weight concern, and related self-image, dangerous dieting practices and in some cases eating disorders and disordered eating, emerged from the small sample of parents and young people I interviewed in Chapter 4. This became a focal point for my next study (**Chapter 5**) which looked at weight concern in adolescents on a population level. I was hoping to see whether weight concern was really as widespread as my interviews suggested and whether there were any demographic groups more affected than others. I also wanted to know if young people with high weight concern actually wanted support to manage their weight or if the two concepts were mutually exclusive. To do this I added two questions around weight concern and desire for weight management support to a large cross-sectional school survey administered by the Department of Psychiatry. The results showed that weight concern was even more widespread than suspected with approximately one quarter of boys, one half of girls and three quarters of gender diverse young people showing some level of weight concern. The relationship between girls and weight concern is well documented in the literature however the high prevalence of weight concern in gender-diverse young people is relatively unexplored and weight concern in boys, while still the lowest, is much higher than previous literature suggests.^{58,185,223,235} One third of young people expressed a desire for weight loss support and while this was highly correlated to weight concern, it is unclear whether it was also correlated to weight status. Nevertheless, given the desire for weight management support amongst young people, current treatment interventions are ill-equipped to meet such high demand.

This led me to wonder if there was a scalable and effective option that would meet this demand for weight management support in young people. In the introduction, I discussed the promise of digital interventions to support weight management in this

population however the evidence base is scant and the area requires further research. Therefore, in **Chapter 6** I tested the feasibility of using a remote, digital intervention to manage excess weight in adolescents. The primary outcome showed that the study was not feasible in its current state with neither engagement nor recruitment meeting the progression criteria. Whilst disappointing, my previous work has shown how difficult recruitment can be in this age group and indeed, previous research does suggest that adolescents do not generally seek support from health professionals regarding weight.²⁸⁹ Retention was also poor with only 24% of participants engaging with the app at week 12. However, this is reflective of a similar digital intervention study which showed 20% retention at 12 weeks.²⁷¹ Despite the poor feasibility outcomes, amongst completers, the intervention did show promise in reducing BMI z-score and improving eating behaviours. It also showed the ability to reach a wide range of participants who were demographically and geographically diverse. This suggests that if future research could improve procedures to ensure trial feasibility, digital interventions may show promise for future use.

7.3. Strengths and Limitations

This section looks at the general strengths and limitations of this thesis. Strengths and limitations of individual studies are discussed in their respective chapters.

7.3.1. Strengths

A key strength of this thesis is the unique and under-researched nature of the topic. Adolescence remains a relatively neglected area within weight management research; compared with younger children and adults, there are far fewer studies examining how best to support adolescents with excess weight. This is despite the fact that over one-

third of adolescents in the UK live above a healthy weight. Adolescents have distinct needs and preferences, and approaches that are effective in other age groups cannot simply be transferred to this population. Through this thesis, I contribute new and meaningful evidence to a limited literature base.

A further strength is the mixed-methods approach I adopted across this programme of work. I examined adolescent weight management from several complementary angles, including evaluation of a real-world intervention, alongside a rigorously controlled feasibility trial and process evaluation. This allowed me to consider both the effectiveness of an existing intervention and the potential of a novel digital approach. In addition, I combined qualitative research exploring adolescents' and parents' lived experience of excess weight with a large-scale quantitative analysis of population-level survey data. This allowed me to understand both the nuance of weight management views as well as any demographic differences at a population level. Often my studies reinforced each other's findings, strengthening my conclusions.

The collaborative partnerships developed throughout this research represent another important strength of the thesis. In Chapter 3, I worked closely with the Palace for Life Foundation, Foodtalk CIC, and Croydon Council to evaluate the Healthy Eagles intervention. These partnerships enabled me to gain insight into the practical operation of an established weight management programme, including its commissioning context, economic considerations, and delivery challenges. Although the evaluation focused on intervention outcomes, it was underpinned by real-world constraints such as limitations in data collection, venue and staffing costs, and the need to meet

commissioning targets. Understanding these implementation issues is critical for applied research, as they shape both feasibility and scalability in practice.

For Chapter 5, I partnered with the Department of Psychiatry to analyse data from the OxWell Student Survey, which provided access to a large, high-quality dataset on adolescent health and wellbeing. It would not have been feasible to design and administer a survey of over 34,000 students independently within the timeframe of a DPhil, making this collaboration essential for generating population-level evidence. Beyond enabling the analysis itself, the partnership contributed significantly to my development in collaborative working and academic networking. The collaboration arose after I attended an ARC study day where the OxWell Survey was presented; recognising the relevance to my research, I contacted the principal investigator, Dr Fazel, to explore potential opportunities. This initiative led to a productive partnership that has continued beyond the study. Given the substantial overlap between obesity and mental health in adolescence, this ongoing relationship is likely to support future interdisciplinary research in this area.

In Chapter 6, the collaboration with Second Nature provided the opportunity to evaluate a commercially available digital intervention and to gain insight into the operation of the private weight management sector. As my prior experience with digital interventions was limited, this partnership enabled me to develop an understanding of how such programmes are delivered remotely, including participant onboarding, engagement processes, and digital service infrastructure. In addition, training as a Second Nature dietitian allowed me to gain practical experience in delivering a digital weight management intervention myself. This dual perspective as both researcher and

practitioner provided valuable insight into the advantages and challenges of digital delivery, including issues related to engagement, scalability, and participant support.

Finally, the diversity of participants across my studies is a notable strength. All four studies included adolescents from a broad range of ethnic backgrounds and levels of socioeconomic deprivation. This contrasts with much of the existing literature, which frequently includes predominantly White, middle-class populations. The demographic diversity of my studies increases the external validity of the findings and supports their applicability to real-world settings. As a result, the conclusions drawn from this thesis are more likely to be relevant to the provision of population-level services than narrowly focused research studies.

7.3.2. Limitations

A key limitation of this thesis relates to the impact that recruitment challenges had on the scope and strength of the evidence generated. Achieving meaningful engagement with adolescents proved difficult across several components of the research, particularly within the qualitative study and the feasibility trial, despite extensive efforts and the use of multiple recruitment strategies. In the latter, this was through health professionals across various parts of the system, including primary and secondary care. In contrast, the two school-based studies, Healthy Eagles and the OxWell Student Survey, were able to recruit large and diverse samples, demonstrating that school settings provided a far more effective route to participation. Difficulties recruiting adolescents outside of school-based settings resulted in smaller sample sizes for the qualitative study and feasibility trial than originally intended. This limited the statistical power of quantitative analyses, reduced the diversity of perspectives captured in

qualitative work, and constrained the generalisability of findings ultimately reducing the strength of the conclusions that could be drawn. However, these experiences also offer an important methodological insight, suggesting that future adolescent weight management research may benefit from prioritising recruitment approaches embedded within schools rather than relying on healthcare or community-based pathways.

Patient and Public Involvement (PPI) within this thesis was also limited. Although I undertook some large-scale engagement activities, including school assemblies and community-based events, I was unable to sustain an ongoing youth PPI group.

Meaningful PPI with adolescents requires substantial time and resource and is particularly challenging when the research topic is highly stigmatised. In order to engage in a meaningful way around a topic such as weight which is often shameful, the development of trust is essential, something which takes time. I reflect further on these challenges, and their implications for future research, in the key reflections section below.

A further limitation of this thesis relates to researcher positionality. I approached this research as a registered dietitian with many years of professional experience in childhood weight management. While this background provided valuable contextual knowledge and facilitated engagement with services and stakeholders, it may also have shaped how I designed studies, interpreted data, and interacted with participants. My clinical training is grounded in promoting healthy weight, and this perspective could have influenced the framing of research questions or the emphasis placed on particular findings. To mitigate this, I sought to maintain reflexivity throughout the research process through regular discussions with my supervisors and others in the research

team, multidisciplinary collaborations, and transparent reporting of methods.

Nevertheless, complete objectivity is not possible, and it is important to acknowledge that my professional identity and prior experiences as well as those of my supervisors, are likely to have influenced aspects of the work.

7.4. Key Reflections

Throughout this work I have sought to reflect on my day-to-day learning and this has shaped my interpretation of the results of each piece of work. In drawing this thesis together, I have further considered the impact of some of the practical and logistical aspects of my research as well as personal reflections on the research process undertaken during my DPhil.

Undertaking this thesis has highlighted to me just how complex and challenging it is to conduct research with adolescents. Prior to beginning this work, I was aware that relatively little weight management research focused specifically on adolescents; I now have a much clearer understanding of why. Ethical and practical issues around consent, assent, and competence are rarely straightforward, and the developmental differences between a 13-year-old and a 17-year-old can be substantial, yet standardised research protocols often require that they are treated as a single homogeneous group. Parental involvement adds further complexity: adolescents may or may not have their own phone, computer, or email address, and communication frequently has to be mediated through parents. Even routine aspects of participation can be disrupted by the realities of adolescent life, such as exams or parental restrictions on technology. Young people occupy an ambiguous space, they are increasingly autonomous, but not fully independent, and this has important implications for how research and interventions

are designed. I have also learned that adolescents hold distinct perspectives and draw information from sources that differ markedly from those of adults. For example, social media plays a much larger role in adolescent's lives than those of adults and their relationship with technology is often different to that of adults. As a result, meaningful research in this field requires far greater investment in PPI and genuine co-production with young people in order to create anything meaningful to them.

One of the most established approaches to youth involvement in research is the use of a Young People's Advisory Group (YPAG), which provides ongoing advice, feedback, and opportunities for co-production. However, I quickly realised that running a YPAG is highly time- and resource-intensive, requiring sustained relationship building that was not feasible within the timeframe of my DPhil. I therefore sought to access an existing YPAG rather than establish a new group. Despite contacting numerous YPAGs across charities, youth organisations, and university departments, access to established groups was rarely extended to external researchers. Within my department, discussions with our PPI coordinator about creating a shared YPAG were positive but ultimately not achievable during my DPhil. Late in my studies, I met a researcher from the Department of Psychiatry who described their team's approach to running online YPAGs recruited through social media, a tested and practical model for youth PPI. In hindsight, implementing a similar approach at the outset would have enabled more consistent youth input across my projects.

To strengthen my understanding of PPI in youth, I joined the organising committee of a national paediatric PPI working group and completed specialist training. While valuable, these activities also underscored how underdeveloped this area remains. Current

literature suggests significant gaps in guidance around standardised methods, reporting practices and ethical considerations on PPI with young people.^{290,291} Recognising these gaps has shaped my view that developing robust, ethical, and practical models of youth PPI should be a priority for future research.

A further reflection from this thesis relates to the limited paediatric expertise available within my immediate research environment. At the outset of my doctoral studies, there was relatively little experience within the team or department of conducting research with children and adolescents. As a result, I often had to navigate complex issues such as safeguarding procedures, ethical approvals, consent and assent processes, and PPI requirements without having a roadmap to follow. Working with a paediatric population required additional steps, including obtaining a DBS check and completing formal safeguarding training, yet the need for these processes was not always well understood or easily facilitated at a departmental level. This meant that both identifying what was required and arranging the practical logistics became an ongoing challenge alongside my research. While demanding, this process ultimately strengthened my skills and highlighted the importance of building clearer institutional support for researchers working with young people.

Identifying a suitable partner for the digital intervention proved to be one of the most challenging aspects of this thesis. Over an extended period, I held discussions with a wide range of potential collaborators, including Weight Watchers, Slimming World, Public Health England, Oviva, NHS-based digital teams, Weight Wise, MyFitnessPal, and Weigh2Go Sandwell. In each case, however, significant barriers emerged. Many platforms were not designed for adolescents, were prohibitively expensive for research

use, were still in development, or raised concerns around data privacy, governance, and intellectual property. These difficulties had a direct impact on study design. My original plan for the qualitative study included a “think-aloud” component in which participants would use a digital app and provide real-time feedback. This element ultimately had to be abandoned because a suitable intervention could not be identified within the necessary timeframe. When collaboration with Second Nature was finally established, the app was already a fixed commercial product, and I was unable to make any substantive adaptations for research purposes. As a result, opportunities for co-design and iterative refinement were limited. This experience highlighted to me the challenges of conducting digital intervention research without an in-house digital support team and the necessary time and resources.

Recruitment challenges were a recurring theme throughout this thesis and represent one of my most significant practical reflections. Recruiting adolescents individually for the qualitative study proved particularly difficult despite extensive efforts and a wide range of approaches. Traditional recruitment routes were often ineffective, and even social media—an obvious avenue for reaching young people—was not viable because platform advertising policies restrict the use of terms such as “weight” and “diet.” For the feasibility trial, I anticipated that recruitment via healthcare professionals might provide a more direct and credible route to participants. In practice, however, this approach was also slow and largely unsuccessful, reflecting both limited clinical capacity and adolescents’ reluctance to engage with weight-related services. In contrast, the two school-based studies achieved substantially higher levels of engagement and more diverse samples. While this was partly a function of study design, it also reinforced that schools are one of the few settings where large numbers

of young people can be reached in an equitable and non-stigmatising manner. Digital interventions may offer similar reach, provided barriers to uptake are minimised and enrolment processes are straightforward. Taken together, these experiences suggest that recruitment for adolescent weight management research requires a fundamentally different approach from that used in adult populations, with greater emphasis on school-based and self-referral strategies rather than reliance on healthcare system pathways.

7.5. Implications of this research and future directions

7.5.1. Practice implications

There are various practical and clinical implications arising from this research. Findings from Chapter 4 have important implications for how childhood weight management services are designed and accessed. Through the qualitative work, I learned that many young people do not wish to discuss weight with healthcare professionals and are uncomfortable with clinicians initiating conversations about weight. Instead, adolescents expressed a preference for anonymous, evidence-based support delivered in a non-stigmatising way. This challenges traditional service models that rely on healthcare professionals to identify, refer, and manage young people with excess weight. My experience within the feasibility trial reinforced this, as recruitment through healthcare professionals was largely unsuccessful. Taken together, these findings suggest that services which position healthcare professionals as gatekeepers to support may inadvertently create additional barriers to engagement and that alternative, more accessible routes to support are needed. These may include school-based support, community hubs or digital support that can easily accessed without

referral from an HCP. Essentially, taking services to environments, either physical or digital, that adolescents already frequent may improve access. A case study from Kent Community Health showed how they used Snapchat to promote their sexual health chatline.²⁹² Contact with the services rose from 96 to 979 in 2 years, a 925% increase in young people accessing support by promoting it in a space where adolescents are already present.²⁹²

Chapter 3 provided evidence that schools may represent an effective setting for adolescent weight management programmes. The Healthy Eagles evaluation demonstrated greater engagement and reach when interventions were delivered within schools, with outcomes that were comparable to, and in some cases better than, community-based programmes. Importantly, there was no evidence of harm for young people of a healthy weight. Given that approximately half of local authorities in England currently commission weight management services, this finding has clear relevance for commissioners and providers.²⁹³ Current NICE guidelines says only that weight management venues should be easily accessible and a place where participants feel comfortable, but there is no mention of schools in either the NICE guidance or commissioning guidelines.^{1,294} This represents a notable gap, particularly as many local authorities are already delivering, or actively considering delivering, adolescent weight management programmes within school settings. Commissioners often report uncertainty about whether school-based delivery aligns with best practice in the absence of explicit policy endorsement. I have already seen the influence of this research in practice, as local commissioners have used the results of this evaluation to inform decisions about whether to locate adolescent programmes in schools or in community venues. In light of this evidence, schools might at a minimum be

recognised within national guidance as a potential and appropriate setting for adolescent weight management services.

The feasibility study in Chapter 6 offered a further model for service delivery that is neither school nor community based, but digital. Local authorities are increasingly encouraged to explore digital approaches as part of long-term NHS strategy, yet many commissioners remain uncertain about how digital provision could be applied to weight management in young people. At the same time, commercial providers are keen to develop youth focused products but require evidence to guide development. My research begins to address both needs. The findings provide early evidence about the potential role of app-based support for adolescents and highlight key considerations for engagement and acceptability. Since completing the study, I have already been contacted by several local authorities and by digital providers seeking to use this evidence to inform future service planning, demonstrating the real-world relevance of this work.

A key next step to change practice would be to develop a co-produced, youth-centred digital intervention as an option for adolescents seeking weight management support. This intervention should be available through self-referral, schools, and community routes without the need for healthcare professional gatekeeping. The app would provide evidence-based behavioural support alongside content addressing weight concern, body image, and emotional wellbeing, reflecting the psychological drivers of help-seeking identified in this thesis. Digital self-monitoring and personalised feedback could be combined with light-touch human support where needed, creating a scalable but responsive model. Young people who do not improve, or who present with more

complex needs such as significant mental health difficulties or disordered eating behaviours, could then be stepped up to more intensive multidisciplinary services. Future research might therefore evaluate a digital care pathway, examining reach, engagement, equity of access, clinical outcomes, and cost effectiveness compared with traditional clinic-based referral models.

Chapters 4 and 5 together illustrate the close and complex relationship between weight and mental health in adolescence. Traditionally, mental health services and weight management services have operated in silos, with little communication or shared understanding. My findings suggest that this separation does not reflect the lived experiences of young people. Weight concern emerged as a significant issue for many adolescents and parents, often independent of actual weight status, and was closely linked to emotional wellbeing. These results indicate that effective support for adolescents with excess weight cannot focus solely on physical health outcomes. In practice, this points to a need for closer integration between services, improved communication pathways, and greater mental health training for weight management practitioners, alongside improved awareness of weight related issues within mental health settings.

Finally, Chapter 5 highlighted the scale of unmet need for adolescent weight management support. A substantial proportion of young people reported both weight concern and a desire for help, far exceeding the capacity of current treatment pathways. Traditional face-to-face services alone are unlikely to meet this level of demand, either financially or practically. By exploring alternative models, including school-based programmes and digital interventions, this thesis offers potential routes to deliver

support at a population level. The findings also emphasise that services must address weight concern as well as weight itself, as many adolescents seeking help are motivated primarily by worries about shape and appearance rather than clinical weight status. Meeting this broader need will require more flexible, accessible, and psychologically informed approaches to adolescent weight management.

7.5.2. Research implications

From the findings of this thesis, I have identified 3 main areas for future research.

7.5.2.1. Refining the feasibility of using a digital intervention for adolescent weight management

Chapter 6 demonstrated that, in its current form, the digital intervention trial was not feasible. However, the findings also indicated that app-based support shows considerable potential as a means of delivering weight management interventions to adolescents. The study provided valuable insights into both the opportunities and the limitations of this approach, highlighting challenges related to recruitment methods, intervention design, and engagement. These learnings suggest that the concept of a digital intervention remains promising, but that future research should focus on refining the trial parameters and delivery model. In particular, a further feasibility study is warranted that incorporates alternative recruitment strategies and evaluates a more youth centred app developed specifically for adolescents.

The feasibility trial used an existing adult focused product that could not be adapted for research purposes, and recruitment relied primarily on healthcare professional referral routes, which proved largely ineffective. These constraints limited both engagement and

the extent to which the intervention could truly reflect the needs and preferences expressed by young people in earlier chapters.

Future research should therefore test a revised model that addresses these limitations directly. A new feasibility trial would benefit from recruitment methods that are more closely aligned with adolescents' help seeking behaviours, such as school-based recruitment, social media campaigns designed specifically for young people, or self-referral pathways that avoid the need for healthcare professional gatekeeping. In addition, there is a clear need to evaluate a digital intervention that has been co-produced with adolescents from the outset. Earlier findings from this thesis showed that young people value anonymity, flexibility, and interactive tracking features, suggesting that a genuinely youth centred app may achieve higher levels of engagement and acceptability than platforms adapted from adult services.

Such a trial should incorporate iterative co-design, beta testing with young people, and process evaluation alongside outcome measures to better understand how adolescents use and experience digital support. It would also be interesting to explore longer follow up periods, objective measures of engagement, and integration with school or community settings. Conducting a further feasibility study of this nature would provide the necessary evidence base to determine whether a large scale randomised controlled trial of a bespoke adolescent digital intervention is both warranted and achievable. Ultimately, this line of research offers a promising opportunity to develop scalable, accessible, and non-stigmatising support that aligns closely with national policy priorities and with the expressed preferences of young people.

7.5.2.2. Using PPI and co-production to inform intervention development

A key research implication arising from this thesis is the need for far greater use of PPI and genuine co-production when developing interventions for adolescents. My experiences across the programme of work demonstrated that many of the practical barriers encountered could potentially have been anticipated or avoided had young people's views been sought more systematically at an earlier stage. Decisions such as relying on healthcare professional referral routes or using telephone-based communication were made on the assumption that they would be acceptable, yet later findings revealed that these approaches did not align with adolescents' preferences. Although PPI is recommended for all projects throughout the research cycle, it is still either lacking or tokenistic in many studies involving children and young people.²⁹⁵ Future research in this field should therefore prioritise early and meaningful engagement with young people to ensure that study design, recruitment strategies, and modes of delivery are shaped by the needs of the intended users.

The feasibility study also highlighted the value of co-production specifically in relation to digital interventions. Co-production is a relatively new concept in intervention design with young people however, previous research suggests it is both empowering and educational for young people to be involved.²⁹⁶ However, the research also points to the time demands of co-production, namely imparting expectations and knowledge, and building relationships and trust with young people.²⁹⁶ Iterative co-design work, including beta-level testing with young people, could substantially strengthen the relevance, usability, and engagement potential of digital tools. Future trials should embed structured opportunities for adolescents to contribute to the design and

refinement of interventions prior to large-scale evaluation, rather than relying solely on adaptations of adult-focused products.

An additional implication is that the field urgently requires clearer and more robust guidance on how to conduct PPI with young people. Throughout this thesis I found that processes around consent, safeguarding, and ethical involvement were often ambiguous, with limited practical direction available to researchers. In contrast, within my voluntary work with youth organisations such as the Football Association and the Scout Association, safeguarding procedures and ethical guidance are extremely well developed, with clear protocols for how to work safely and appropriately with young people. Comparable standards do not currently exist for research-based PPI; however, the literature is catching up. Researchers in Ireland have just submitted a protocol for a “state of science” review into PPI practices with children, young people and families.²⁹⁵ This should hopefully lay the groundwork for more robust practice guidelines in this field.

7.5.2.3. Integrating obesity and mental health research

A major research implication arising from this thesis is the urgent need to better integrate obesity and mental health research for adolescents. Across both the qualitative and quantitative components of my work, weight concern emerged as a pervasive and distressing issue that extends far beyond physical weight status. My findings indicate that approximately 41% of adolescents report significant weight concern which is strongly associated with anxiety, depression, and disordered eating behaviours, and often described by young people as more troubling than their actual body weight. Parents similarly emphasised the emotional burden that weight concern

placed on family wellbeing. Despite this, current research in this field remains largely organised around physical weight outcomes, with limited attention to the psychological dimensions of weight related distress. Future research might therefore focus on developing and evaluating interventions that explicitly address weight concern as a primary outcome, using co-production and implementation science approaches to ensure that support is safe, acceptable, and genuinely youth centred. In response to this need, I am collaborating with the adolescent mental health team at King's College London on a proposal to design, implement, and evaluate a mental-health support package that can be integrated within existing weight management services and also delivered universally for young people experiencing weight concern who do not meet traditional weight-status criteria. This grant is planned for submission to NIHR in April 2026.

A second, and closely related implication, concerns the substantial overlap between excess weight and disordered eating behaviours. There is increasing evidence that adolescents living with obesity frequently experience problematic eating patterns, with estimates suggesting that up to 82% exhibit at least one disordered eating behaviour and that around one-third meet criteria for a clinically defined eating disorder. This figure appears to be even higher among neurodiverse young people. Obesity research in this age group should not ignore disordered eating behaviours either in screening, intervention design or outcomes. Future studies should routinely incorporate validated measures of disordered eating, ensure that interventions are psychologically informed and do not inadvertently exacerbate harmful behaviours, and develop clear protocols for managing risk when disordered eating is identified. There is also a need for trials that explicitly test integrated models of care, rather than excluding young people with

complex presentations, in order to generate evidence for safe and effective approaches for this currently underserved group.

Together, these findings point to a clear need for research that actively bridges the divide between obesity and mental health research. Future studies might seek to ensure that when obesity is studied, mental health implications are not treated as secondary, but as central components of both study design and evaluation. Research could also move towards developing and testing integrated intervention models that address both obesity and mental health. This will ensure the research is better positioned to reflect young people's lived experiences and to generate evidence that supports coordinated care.

7.5.2.4. Addressing current NICE evidence gaps

Collectively, the findings from this thesis align closely with several current NICE research recommendations for overweight and obesity management in children and young people.¹ In particular, the research contributes to NICE priorities relating to intervention uptake and adherence, barriers and facilitators to participation, young people's beliefs about weight, and the potential psychological risks associated with weight management approaches.

Across the programme of work, adolescents consistently described weight as a sensitive and emotionally charged issue, often shaped by stigma, shame, and social pressures. The findings suggest that these psychological and social factors may substantially influence whether young people engage with, avoid, or disengage from support services, reinforcing NICE recommendations that future research should better understand how beliefs about weight affect participation in BWMIIs.

My thesis also contributes to NICE priorities regarding how best to engage young people in weight management support. Findings from the feasibility trial demonstrated that traditional healthcare professional referral pathways were largely ineffective, while qualitative findings suggested that adolescents valued anonymity, flexibility, autonomy, and non-stigmatising forms of support. These findings indicate that existing service models may not align with adolescent help-seeking preferences and support NICE recommendations for research exploring barriers and facilitators to engagement in BWMI. The work further highlights the importance of co-production and meaningful PPI in intervention development, particularly for digital interventions, where engagement appears strongly linked to whether platforms reflect the developmental, social, and cultural needs of young people.

Finally, NICE highlights the need for further research into the potential risks associated with weight management interventions, particularly around disordered eating and psychological harm. My findings demonstrate high levels of weight concern among adolescents, especially among girls and gender-diverse young people, and highlight the close relationship between weight concern, mental health, body image, and desire for support. However, further research needs to be done to explicitly assess both the short and long-term effects of BWMI and weight identification in young people and whether there is a causal relationship with eating disorders and disordered eating.

7.5.3. Policy implications

The above research implications are supported by the UK policy direction. The principal policy framework for childhood obesity in England has been the previous government's Childhood Obesity: A Plan for Action, the first part of which was published in 2016 and

the second part in 2018.²⁹⁷ These documents set out a national strategy to reduce the prevalence of childhood obesity and support healthier behaviours among children and families. Early chapters emphasised industry reformulation of products, efforts to reduce sugar intake, and initiatives to support healthier school environments, with a long-term ambition to significantly reduce childhood obesity and to address inequalities in weight outcomes between more and less deprived areas. The focus of this policy is largely on prevention rather than on improving access to and delivery of treatment for children and young people already living with excess weight, meaning many of its actions are not directly aligned with the core focus of this thesis.

More recently, in 2025, the government published “Fit for the future: 10 year health plan for England.”¹¹⁷ This document outlines a comprehensive roadmap for the NHS that sets out long-term priorities for health and care. Although not exclusively focused on obesity, it places chronic conditions, including obesity, within the remit of long-term service reform and integration of care pathways. With regards to obesity treatment in young people, it mirrors a lot of what the Plan for Action outlined with a focus on prevention in the form of junk food advertising, free school meals, and energy drink restrictions. However, it also goes further to discuss digital models of obesity care, more widespread use of GLP-1 medication and reward schemes to incentivise physical activity and healthy eating. Whilst many of these things are not specific to young people, they would benefit from the widespread adoption of these new practices.

There are three elements in the Fit for the Future plan that align with my research: from hospital to community, digital by default, and expanded mental health support.

7.5.3.1. *From hospital to community*

A central priority of the Fit for the Future plan is the shift of care away from hospitals and into community settings that are more accessible to patients. Across several studies, I found that young people were reluctant to access support when healthcare professionals were gatekeepers, and that recruitment and engagement were consistently poor when services relied on traditional clinical pathways. Locating weight management services in settings where young people already feel comfortable and supported, rather than within formal healthcare environments, may therefore remove important barriers to access and engagement. Commissioning guidance should align with policy to include school and youth clubs as evidence-based venues for services. Additionally, commissioning guidance should specifically allow self-referral routes to avoid gatekeeping by HCPs. HCPs can screen referrals after they are made but they should not be a barrier to access.

The plan also highlights that current NHS care is organised into “*multiple, fragmented siloes*.” My findings illustrate how this fragmentation directly affects adolescents living with excess weight. Both the qualitative and survey studies demonstrated that weight concern and mental health difficulties frequently co-exist, yet services for obesity and mental health remain largely separate, with limited communication or integration. This structural divide makes it difficult to deliver the holistic, person-centred care that young people appear to need. As discussed below, the 10-year plan aims to create Young Futures Hubs. Could some of these hubs deal with physical health as well as aligning physical and mental health services for this age group?

Taken together, my research suggests a clear policy imperative to develop more integrated models of support that bring together physical and mental health expertise, ideally delivered within community or school-based settings where adolescents may be more willing to engage.

7.5.3.2. Digital by default

A core principle of the Fit for the Future plan is the commitment to a digital by default model of care. The policy proposes that, where services can be delivered safely and effectively through digital platforms, this should become the primary mode of delivery, allowing patients to access support from home without unnecessary reliance on face-to-face appointments. My feasibility study directly aligns with this ambition by exploring the acceptability and practicality of a digital intervention for adolescent weight management. The plan also outlines the future development of an NHS “HealthStore,” through which patients will be able to access approved digital tools to help manage long term conditions. The intervention evaluated in this thesis could readily fit within such a model, offering young people an accessible route to evidence-based support without the need to engage with healthcare professionals in person.

The policy further emphasises the importance of continuous monitoring and the increasing role of digital tracking and wearable technologies. Findings from my feasibility trial are consistent with this direction, as adolescents reported that the tracking and self-monitoring features were among the most valued components of the app. This suggests that young people may be particularly receptive to digital tools that enable real time feedback and personal monitoring.

From a policy perspective, this evidence supports the development of a digital pathway for adolescent weight management. National bodies could establish standards for youth-specific digital interventions and include adolescent weight management tools within the proposed NHS HealthStore. Commissioning guidance might encourage local authorities to adopt blended models in which digital support is offered alongside more intensive services when required. Investment is also needed in evaluation frameworks to ensure digital services are safe, equitable, and effective for diverse adolescent populations, rather than relying on adult-derived evidence.

Together, these results support the view that digital approaches have considerable potential to form a central component of future adolescent weight management services, in line with national policy priorities.

7.5.3.3. Expanded mental health support

The third area I have identified within Fit for the Future is the planned expansion of Mental Health Support Teams in schools and colleges, alongside the development of Young Futures Hubs to provide more accessible support for children and young people's mental health. This policy direction aligns closely with the findings of my research, which consistently demonstrated the strong overlap between weight concern, excess weight, and poor mental health in adolescence. My studies suggest that young people experience these issues as interconnected rather than separate problems, yet current service structures often treat them in isolation. Embedding support within schools and community-based youth settings offers a practical opportunity to deliver more integrated and holistic care. The Young Futures Hubs, in particular, could provide an appropriate and less stigmatising environment through which weight management

support might be offered alongside mental health and wellbeing services. Developing pathways that incorporate weight related support within these existing initiatives may therefore represent an effective policy mechanism for addressing the needs identified within this thesis. Future commissioning guidance might consider listing these hubs as potential venues for weight treatment interventions. It could also advise mental health services to screen for excess weight, and obesity services to screen for mental health concerns and disordered eating, and refer where appropriate.

7.6. Conclusions

Overall, this thesis addresses important evidence gaps in how best to support adolescents to achieve and maintain a healthy weight. I explored adolescent weight management from multiple perspectives, examining the effectiveness of existing real-world services, the lived experiences and preferences of young people and parents, population level patterns of weight concern and help seeking, and the feasibility of a digital intervention. Together, these studies move beyond a narrow focus on weight outcomes alone and instead consider the broader psychological, social, and practical factors that shape engagement with support during adolescence.

Through this work, I demonstrated that traditional models of childhood weight management, which rely heavily on healthcare professional referral and clinic-based delivery, are poorly aligned with adolescents' needs as well as the future goals of the NHS. School based approaches show some promise for increased engagement, with young people consistently expressing a desire for anonymous, flexible, and non-stigmatising forms of support. My findings also highlighted the close interconnection between weight and mental health, with weight concern emerging as a pervasive issue

that extends across the weight spectrum and strongly influences help seeking behaviour. The feasibility study provided early evidence that digital interventions may offer a promising alternative route to support, while also revealing the practical challenges of recruitment and intervention design when working with adolescents.

Ultimately, this body of work contributes new evidence to an under researched field and provides practical direction for future research, policy, and practice. It demonstrates that supporting adolescents with excess weight is not simply a matter of providing more services, but of providing the right services, in the right settings, and in ways that young people are willing and able to engage with. Building on these insights, there is a clear opportunity to develop more responsive, inclusive, and effective systems of support for young people living with excess weight.

REFERENCES

1. National Institute for Health and Care Excellence. Overweight and Obesity Management [NG246]. <https://www.nice.org.uk/guidance/ng246>
2. Weight management suite: [B] Evidence review for accuracy of anthropometric measures in assessing health risks associated with overweight and obesity in children and young people. NICE guideline CG189 (2022).
3. Organisation WH. Child growth standards. Available from: <https://www.who.int/toolkits/child-growth-standards/standards/body-mass-index-for-age-bmi-for-age>.
4. Cole TJ, Freeman JV, Preece MA. Body mass index reference curves for the UK, 1990. *Arch Dis Child*. Jul 1995;73(1):25–9. doi:10.1136/ad.73.1.25
5. Wright CM, Williams AF, Elliman D, et al. Using the new UK-WHO growth charts. *BMJ*. Mar 15 2010;340:c1140. doi:10.1136/bmj.c1140
6. Freedman DS, Zemel BS, Dietz WH, Daymont C. Screening Accuracy of BMI for Adiposity Among 8- to 19-Year-Olds. *Pediatrics*. Jul 1 2024;154(1)doi:10.1542/peds.2024-065960
7. Health RCoPaC. Childhood and Puberty Close Monitoring form. Accessed at: <https://www.rcpch.ac.uk/resources/uk-who-growth-charts-childhood-puberty-close-monitoring-cpcm>.
8. Rubino F, Cummings DE, Eckel RH, et al. Definition and diagnostic criteria of clinical obesity. *Lancet Diabetes Endocrinol*. Mar 2025;13(3):221–262. doi:10.1016/S2213-8587(24)00316-4
9. National Child Measurement Programme, England, 2023/24 School Year (2024).
10. al. Ge. Estimating the prevalence of overweight and obesity and the incidence of comorbidities in adolescents living with overweight and obesity: a cohort study using routinely collected healthcare data in England between 2008 and 2023. 2025:
11. Health Survey for England 2022 (2024).
12. National Child Measurement Programme, England, 2023/24 School Year (NHS Digital) (2024).
13. Jebb SA, Prentice AM. Single definition of overweight and obesity should be used. *BMJ*. Oct 27 2001;323(7319):999.
14. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ*. May 6 2000;320(7244):1240–3. doi:10.1136/bmj.320.7244.1240
15. Kopelman P, Jebb SA, Butland B. Executive summary: Foresight 'Tackling Obesities: Future Choices' project. *Obes Rev*. Mar 2007;8 Suppl 1:vi–ix. doi:10.1111/j.1467-789X.2007.00344.x
16. Jebeile H, Kelly AS, O'Malley G, Baur LA. Obesity in children and adolescents: epidemiology, causes, assessment, and management. *Lancet Diabetes Endocrinol*. May 2022;10(5):351–365. doi:10.1016/S2213-8587(22)00047-X
17. Kansra AR, Lakkunarajah S, Jay MS. Childhood and Adolescent Obesity: A Review. *Front Pediatr*. 2020;8:581461. doi:10.3389/fped.2020.581461
18. Felso R, Lohner S, Hollody K, Erhardt E, Molnar D. Relationship between sleep duration and childhood obesity: Systematic review including the potential underlying mechanisms. *Nutr Metab Cardiovasc Dis*. Sep 2017;27(9):751–761. doi:10.1016/j.numecd.2017.07.008

19. Farooq A, Martin A, Janssen X, et al. Longitudinal changes in moderate-to-vigorous-intensity physical activity in children and adolescents: A systematic review and meta-analysis. *Obes Rev*. Jan 2020;21(1):e12953. doi:10.1111/obr.12953
20. Mahumud RA, Sahle BW, Owusu-Addo E, Chen W, Morton RL, Renzaho AMN. Association of dietary intake, physical activity, and sedentary behaviours with overweight and obesity among 282,213 adolescents in 89 low and middle income to high-income countries. *Int J Obes (Lond)*. Nov 2021;45(11):2404–2418. doi:10.1038/s41366-021-00908-0
21. Campbell MK. Biological, environmental, and social influences on childhood obesity. *Pediatr Res*. Jan 2016;79(1-2):205–11. doi:10.1038/pr.2015.208
22. Taher AK, Evans N, Evans CE. The cross-sectional relationships between consumption of takeaway food, eating meals outside the home and diet quality in British adolescents. *Public Health Nutr*. Jan 2019;22(1):63–73. doi:10.1017/S1368980018002690
23. National Diet and Nutrition Survey 2019 to 2023: report (2025).
24. Moore R, Vernon T, Gregory M, Freeman EL. Facilitators and barriers to physical activity among English adolescents in secondary schools: a mixed method study. *Front Public Health*. 2023;11:1235086. doi:10.3389/fpubh.2023.1235086
25. Active Lives Children and Young People Survey Academic year 2024-25 (2025).
26. Robinson TN, Banda JA, Hale L, et al. Screen Media Exposure and Obesity in Children and Adolescents. *Pediatrics*. Nov 2017;140(Suppl 2):S97–S101. doi:10.1542/peds.2016-1758K
27. Fang K, Mu M, Liu K, He Y. Screen time and childhood overweight/obesity: A systematic review and meta-analysis. *Child Care Health Dev*. Sep 2019;45(5):744–753. doi:10.1111/cch.12701
28. Screen time: impacts on education and wellbeing (2025).
29. Arcan C, Neumark-Sztainer D, Hannan P, van den Berg P, Story M, Larson N. Parental eating behaviours, home food environment and adolescent intakes of fruits, vegetables and dairy foods: longitudinal findings from Project EAT. *Public Health Nutr*. Nov 2007;10(11):1257–65. doi:10.1017/S1368980007687151
30. Bauer KW, Nelson MC, Boutelle KN, Neumark-Sztainer D. Parental influences on adolescents' physical activity and sedentary behavior: longitudinal findings from Project EAT-II. *Int J Behav Nutr Phys Act*. Feb 26 2008;5:12. doi:10.1186/1479-5868-5-12
31. Scaglioni S, De Cosmi V, Ciappolino V, Parazzini F, Brambilla P, Agostoni C. Factors Influencing Children's Eating Behaviours. *Nutrients*. May 31 2018;10(6)doi:10.3390/nu10060706
32. Schnurr TM, Angquist L, Nohr EA, Hansen T, Sorensen TIA, Morgen CS. Smoking during pregnancy is associated with child overweight independent of maternal pre-pregnancy BMI and genetic predisposition to adiposity. *Sci Rep*. Feb 24 2022;12(1):3135. doi:10.1038/s41598-022-07122-6
33. Lee JS, Jin MH, Lee HJ. Global relationship between parent and child obesity: a systematic review and meta-analysis. *Clin Exp Pediatr*. Jan 2022;65(1):35–46. doi:10.3345/cep.2020.01620
34. Abrego Del Castillo KY, Dennis CL, Wamithi S, et al. Maternal BMI, breastfeeding and perinatal factors that influence early childhood growth trajectories: a scoping review. *J Dev Orig Health Dis*. Oct 2022;13(5):541–549. doi:10.1017/S2040174421000726

35. Concepcion-Zavaleta MJ, Quiroz-Aldave JE, Durand-Vasquez MDC, et al. A comprehensive review of genetic causes of obesity. *World J Pediatr*. Jan 2024;20(1):26–39. doi:10.1007/s12519-023-00757-z
36. Fitch AK, Malhotra S, Conroy R. Differentiating monogenic and syndromic obesities from polygenic obesity: Assessment, diagnosis, and management. *Obes Pillars*. Sep 2024;11:100110. doi:10.1016/j.obpill.2024.100110
37. Hayes JF, Fitzsimmons-Craft EE, Karam AM, Jakubiak J, Brown ML, Wilfley DE. Disordered Eating Attitudes and Behaviors in Youth with Overweight and Obesity: Implications for Treatment. *Curr Obes Rep*. Sep 2018;7(3):235–246. doi:10.1007/s13679-018-0316-9
38. Chaves E, Jeffrey DT, Williams DR. Disordered Eating and Eating Disorders in Pediatric Obesity: Assessment and Next Steps. *Int J Environ Res Public Health*. Aug 24 2023;20(17)doi:10.3390/ijerph20176638
39. Jebeile H, Lister NB, Baur LA, Garnett SP, Paxton SJ. Eating disorder risk in adolescents with obesity. *Obes Rev*. May 2021;22(5):e13173. doi:10.1111/obr.13173
40. Swanson SA, Crow SJ, Le Grange D, Swendsen J, Merikangas KR. Prevalence and correlates of eating disorders in adolescents. Results from the national comorbidity survey replication adolescent supplement. *Arch Gen Psychiatry*. Jul 2011;68(7):714–23. doi:10.1001/archgenpsychiatry.2011.22
41. Hautala LA, Junnila J, Helenius H, et al. Towards understanding gender differences in disordered eating among adolescents. *J Clin Nurs*. Jul 2008;17(13):1803–13. doi:10.1111/j.1365-2702.2007.02143.x
42. Lopez-Gil JF, Garcia-Hermoso A, Smith L, et al. Global Proportion of Disordered Eating in Children and Adolescents: A Systematic Review and Meta-analysis. *JAMA Pediatr*. Apr 1 2023;177(4):363–372. doi:10.1001/jamapediatrics.2022.5848
43. Jankauskiene R, Baceviciene M. Media Pressures, Internalization of Appearance Ideals and Disordered Eating among Adolescent Girls and Boys: Testing the Moderating Role of Body Appreciation. *Nutrients*. May 26 2022;14(11)doi:10.3390/nu14112227
44. Chen DR, Sun G, Levin B. Gender-specific responses to multifaceted factors associated with disordered eating among adolescents of 7th to 9th grade. *J Eat Disord*. Jan 10 2022;10(1):5. doi:10.1186/s40337-021-00524-3
45. Roberts KJ, Chaves E. Beyond Binge Eating: The Impact of Implicit Biases in Healthcare on Youth with Disordered Eating and Obesity. *Nutrients*. Apr 13 2023;15(8)doi:10.3390/nu15081861
46. Keast R, Withnell S, Bodell LP. Longitudinal associations between weight stigma and disordered eating across the weight spectrum. *Eat Behav*. Aug 2023;50:101788. doi:10.1016/j.eatbeh.2023.101788
47. Sharma A, Vidal C. A scoping literature review of the associations between highly visual social media use and eating disorders and disordered eating: a changing landscape. *J Eat Disord*. Sep 26 2023;11(1):170. doi:10.1186/s40337-023-00898-6
48. Sanzari CM, Gorrell S, Anderson LM, et al. The impact of social media use on body image and disordered eating behaviors: Content matters more than duration of exposure. *Eat Behav*. Apr 2023;49:101722. doi:10.1016/j.eatbeh.2023.101722
49. Dopelt K, Houminer-Klepar N. The Impact of Social Media on Disordered Eating: Insights from Israel. *Nutrients*. Jan 3 2025;17(1)doi:10.3390/nu17010180

50. Engeland A, Bjorge T, Sogaard AJ, Tverdal A. Body mass index in adolescence in relation to total mortality: 32-year follow-up of 227,000 Norwegian boys and girls. *Am J Epidemiol*. Mar 15 2003;157(6):517–23. doi:10.1093/aje/kwf219
51. Must A, Strauss RS. Risks and consequences of childhood and adolescent obesity. *Int J Obes Relat Metab Disord*. Mar 1999;23 Suppl 2:S2–11. doi:10.1038/sj.ijo.0800852
52. Simmonds M, Llewellyn A, Owen CG, Woolacott N. Predicting adult obesity from childhood obesity: a systematic review and meta-analysis. *Obes Rev*. Feb 2016;17(2):95–107. doi:10.1111/obr.12334
53. Steinbeck KS, Lister NB, Gow ML, Baur LA. Treatment of adolescent obesity. *Nat Rev Endocrinol*. Jun 2018;14(6):331–344. doi:10.1038/s41574-018-0002-8
54. Viner RM, Arkell EK, Ashe M, Simpson M. Responding to the changing burden of disease for children and adolescents in modern Britain: the RCPCH State of Child Health Report 2017. *BMJ Paediatr Open*. 2017;1(1):e000026. doi:10.1136/bmjpo-2017-000026
55. Dwyer JT, Stone EJ, Yang M, et al. Prevalence of marked overweight and obesity in a multiethnic pediatric population: findings from the Child and Adolescent Trial for Cardiovascular Health (CATCH) study. *J Am Diet Assoc*. Oct 2000;100(10):1149–56. doi:10.1016/s0002-8223(00)00337-0
56. Eslam M, Alkhoury N, Vajro P, et al. Defining paediatric metabolic (dysfunction)-associated fatty liver disease: an international expert consensus statement. *Lancet Gastroenterol Hepatol*. Oct 2021;6(10):864–873. doi:10.1016/S2468-1253(21)00183-7
57. Llewellyn A, Simmonds M, Owen CG, Woolacott N. Childhood obesity as a predictor of morbidity in adulthood: a systematic review and meta-analysis. *Obes Rev*. Jan 2016;17(1):56–67. doi:10.1111/obr.12316
58. Blundell E, De Stavola BL, Kellock MD, et al. Longitudinal pathways between childhood BMI, body dissatisfaction, and adolescent depression: an observational study using the UK Millenium Cohort Study. *Lancet Psychiatry*. Jan 2024;11(1):47–55. doi:10.1016/S2215-0366(23)00365-6
59. Marmorstein NR, Iacono WG, Legrand L. Obesity and depression in adolescence and beyond: reciprocal risks. *Int J Obes (Lond)*. Jul 2014;38(7):906–11. doi:10.1038/ijo.2014.19
60. Jebeile H, Cardel MI, Kyle TK, Jastreboff AM. Addressing psychosocial health in the treatment and care of adolescents with obesity. *Obesity (Silver Spring)*. Sep 2021;29(9):1413–1422. doi:10.1002/oby.23194
61. Pont SJ, Puhl R, Cook SR, Slusser W, Section On O, Obesity S. Stigma Experienced by Children and Adolescents With Obesity. *Pediatrics*. Dec 2017;140(6)doi:10.1542/peds.2017-3034
62. Ma L, Chu M, Li Y, et al. Bidirectional relationships between weight stigma and pediatric obesity: A systematic review and meta-analysis. *Obes Rev*. Jun 2021;22(6):e13178. doi:10.1111/obr.13178
63. Roberts KJ, Polfuss ML, Marston EC, Davis RL. Experiences of weight stigma in adolescents with severe obesity and their families. *J Adv Nurs*. Oct 2021;77(10):4184–4194. doi:10.1111/jan.15012
64. Wang YC, McPherson K, Marsh T, Gortmaker SL, Brown M. Health and economic burden of the projected obesity trends in the USA and the UK. *Lancet*. Aug 27 2011;378(9793):815–25. doi:10.1016/S0140-6736(11)60814-3

65. Finkelstein EA, Trogdon JG, Cohen JW, Dietz W. Annual medical spending attributable to obesity: payer-and service-specific estimates. *Health Aff (Millwood)*. Sep–Oct 2009;28(5):w822–31. doi:10.1377/hlthaff.28.5.w822
66. Onyimadu O, Hayes A, Fahr P, et al. Child Body Mass Index and Health Care Costs in England. *JAMA Netw Open*. Oct 1 2025;8(10):e2537560. doi:10.1001/jamanetworkopen.2025.37560
67. Onyimadu O, Violato M, Astbury NM, Jebb SA, Petrou S. Health Economic Aspects of Childhood Excess Weight: A Structured Review. *Children (Basel)*. Mar 24 2022;9(4)doi:10.3390/children9040461
68. Onyimadu O, Violato M, Astbury NM, et al. A systematic review of economic evaluations of interventions targeting childhood overweight and obesity. *Obes Rev*. Sep 2023;24(9):e13597. doi:10.1111/obr.13597
69. Tsiros MD, Sinn N, Coates AM, Howe PR, Buckley JD. Treatment of adolescent overweight and obesity. *Eur J Pediatr*. Jan 2008;167(1):9–16. doi:10.1007/s00431-007-0575-z
70. Jones HM, Oyebode O, Melendez-Torres GJ, Al-Khudairy L. Professional stakeholder's views of adolescent weight management programmes: a qualitative study. *BMC Res Notes*. Apr 3 2021;14(1):125. doi:10.1186/s13104-021-05512-z
71. Ball GDC, Sebastiani M, Wijesundera J, et al. Strategies to reduce attrition in managing paediatric obesity: A systematic review. *Pediatr Obes*. Apr 2021;16(4):e12733. doi:10.1111/ijpo.12733
72. Al-Khudairy L, Loveman E, Colquitt JL, et al. Diet, physical activity and behavioural interventions for the treatment of overweight or obese adolescents aged 12 to 17 years. *Cochrane Database Syst Rev*. Jun 22 2017;6:CD012691. doi:10.1002/14651858.CD012691
73. Yerges AL, Snethen JA, Carrel AL. Adolescent Girls With Overweight and Obesity Feel Physically Healthy and Highlight the Importance of Mental Health. *SAGE Open Nurs*. Jan–Dec 2021;7:23779608211018523. doi:10.1177/23779608211018523
74. Catherine Homer 1 LE, Nivedita Aswani 3 , James Nobles 2 , Jamie Matu 2 , Adam Martin 4 , Taya Zabula 4 , Paige Davies 2 , Neil Wright 3 , Caroline Steele 5 & Julian Hamilton-Shield 6. National evaluation of 39 complications of excess weight (CEW) clinics: exploring how innovation in design has been determined by individual and population health inequities. 2025:
75. Hawton K, Apperley L, Parkinson J, et al. Complications of excess weight seen in two tier 3 paediatric weight management services: an observational study. *Arch Dis Child*. Feb 19 2025;110(3):216–220. doi:10.1136/archdischild-2024-327286
76. Chanoine JP, Richard M. Early weight loss and outcome at one year in obese adolescents treated with orlistat or placebo. *Int J Pediatr Obes*. Apr 2011;6(2):95–101. doi:10.3109/17477166.2010.519387
77. Hawton K, Shirodkar D, Siese T, Hamilton-Shield JP, Giri D. A recent update on childhood obesity: aetiology, treatment and complications. *J Pediatr Endocrinol Metab*. May 26 2025;38(5):429–441. doi:10.1515/jpem-2024-0316
78. Kelly AS, Auerbach P, Barrientos-Perez M, et al. A Randomized, Controlled Trial of Liraglutide for Adolescents with Obesity. *N Engl J Med*. May 28 2020;382(22):2117–2128. doi:10.1056/NEJMoa1916038

79. Weghuber D, Barrett T, Barrientos-Perez M, et al. Once-Weekly Semaglutide in Adolescents with Obesity. *N Engl J Med*. Dec 15 2022;387(24):2245–2257. doi:10.1056/NEJMoa2208601
80. Bensignor MO, Arslanian S, Vajravelu ME. Semaglutide for management of obesity in adolescents: efficacy, safety, and considerations for clinical practice. *Curr Opin Pediatr*. Aug 1 2024;36(4):449–455. doi:10.1097/MOP.0000000000001365
81. Torbahn G, Lischka J, Brown T, et al. Anti-Obesity Medication in the Management of Children and Adolescents With Obesity: Recent Developments and Research Gaps. *Clin Endocrinol (Oxf)*. Jan 2025;102(1):51–61. doi:10.1111/cen.15133
82. England N. National Obesity Audit: 2023–24. Accessed 03.01.2026,
83. Inge TH, Courcoulas AP, Jenkins TM, et al. Five-Year Outcomes of Gastric Bypass in Adolescents as Compared with Adults. *N Engl J Med*. May 30 2019;380(22):2136–2145. doi:10.1056/NEJMoa1813909
84. Olbers T, Beamish AJ, Gronowitz E, et al. Laparoscopic Roux-en-Y gastric bypass in adolescents with severe obesity (AMOS): a prospective, 5-year, Swedish nationwide study. *Lancet Diabetes Endocrinol*. Mar 2017;5(3):174–183. doi:10.1016/S2213-8587(16)30424-7
85. Goldschmidt AB, Khoury JC, Mitchell JE, et al. Loss of Control Eating and Health Indicators Over 6 Years in Adolescents Undergoing Metabolic and Bariatric Surgery. *Obesity (Silver Spring)*. Apr 2021;29(4):740–747. doi:10.1002/oby.23126
86. Jarvholm K, Bruze G, Peltonen M, et al. 5-year mental health and eating pattern outcomes following bariatric surgery in adolescents: a prospective cohort study. *Lancet Child Adolesc Health*. Mar 2020;4(3):210–219. doi:10.1016/S2352-4642(20)30024-9
87. Felsenreich DM, Artemiou E, Wintersteller L, et al. Fifteen Years after Sleeve Gastrectomy: Gastrosopies, Manometries, and 24-h pH-Metries in a Long-Term Follow-Up: A Multicenter Study. *Obes Facts*. 2022;15(5):666–673. doi:10.1159/000526170
88. Beamish AJ, Ryan Harper E, Jarvholm K, Janson A, Olbers T. Long-term Outcomes Following Adolescent Metabolic and Bariatric Surgery. *J Clin Endocrinol Metab*. Aug 18 2023;108(9):2184–2192. doi:10.1210/clinem/dgad155
89. Torbahn G, Brauchmann J, Axon E, et al. Surgery for the treatment of obesity in children and adolescents. *Cochrane Database Syst Rev*. Sep 8 2022;9(9):CD011740. doi:10.1002/14651858.CD011740.pub2
90. Franco JV, Guo Y, Bongaerts B, et al. Multimodal health behaviour-changing interventions for adolescents living with obesity. *Cochrane Database Syst Rev*. Dec 18 2025;12(12):CD016062. doi:10.1002/14651858.CD016062
91. Overweight and obesity management: preventing, assessing and managing overweight and obesity [G] Evidence review for effectiveness and acceptability of weight management interventions in children and young people living with overweight and obesity (2025).
92. McCrabb S, Lane C, Hall A, et al. Scaling-up evidence-based obesity interventions: A systematic review assessing intervention adaptations and effectiveness and quantifying the scale-up penalty. *Obes Rev*. Jul 2019;20(7):964–982. doi:10.1111/obr.12845
93. Viner RM, Kinra S, Christie D, et al. Improving the assessment and management of obesity in UK children and adolescents: the PROMISE research programme including a RCT. *Improving the assessment and management of obesity in UK children and*

adolescents: the PROMISE research programme including a RCT. 2020. Programme Grants for Applied Research.

94. Morinder G, Biguet G, Mattsson E, Marcus C, Larsson UE. Adolescents' perceptions of obesity treatment--an interview study. *Disabil Rehabil.* 2011;33(12):999–1009. doi:10.3109/09638288.2010.520800
95. Jones HM, Al-Khudairy L, Melendez-Torres GJ, Oyebo O. Viewpoints of adolescents with overweight and obesity attending lifestyle obesity treatment interventions: a qualitative systematic review. *Obes Rev.* Jan 2019;20(1):156–169. doi:10.1111/obr.12771
96. Silva DFO, Sena-Evangelista KCM, Lyra CO, Pedrosa LFC, Arrais RF, Lima S. Motivations for weight loss in adolescents with overweight and obesity: a systematic review. *BMC Pediatr.* Nov 21 2018;18(1):364. doi:10.1186/s12887-018-1333-2
97. Cardel MI, Szurek SM, Dillard JR, et al. Perceived barriers/facilitators to a healthy lifestyle among diverse adolescents with overweight/obesity: A qualitative study. *Obes Sci Pract.* Dec 2020;6(6):638–648. doi:10.1002/osp4.448
98. Lee AM, Szurek SM, Dilip A, et al. Behavioral Weight Loss Intervention Preferences of Adolescents with Overweight/Obesity. *Child Obes.* Apr 2021;17(3):160–168. doi:10.1089/chi.2020.0296
99. Havdal HH, Fosse E, Gebremariam MK, et al. Perceptions of the social and physical environment of adolescents' dietary behaviour in neighbourhoods of different socioeconomic position. *Appetite.* Apr 1 2021;159:105070. doi:10.1016/j.appet.2020.105070
100. Pila E, Sylvester BD, Corson L, Folkman C, Huellemann KL, Sabiston CM. Relative contributions of health behaviours versus social factors on perceived and objective weight status in Canadian adolescents. *Can J Public Health.* Jan 11 2021;doi:10.17269/s41997-020-00458-4
101. Kebbe M, Perez A, Buchholz A, et al. Adolescents' involvement in decision-making for pediatric weight management: A multi-centre, qualitative study on perspectives of adolescents and health care providers. *Patient Educ Couns.* Jun 2019;102(6):1194–1202. doi:10.1016/j.pec.2019.01.017
102. Kovacs BE, Gillison FB, Barnett JC. Is children's weight a public health or a private family issue? A qualitative analysis of online discussion about National Child Measurement Programme feedback in England. *BMC Public Health.* Nov 26 2018;18(1):1295. doi:10.1186/s12889-018-6214-y
103. Syrad H, Falconer C, Cooke L, et al. Health and happiness is more important than weight': a qualitative investigation of the views of parents receiving written feedback on their child's weight as part of the National Child Measurement Programme. *J Hum Nutr Diet.* Feb 2015;28(1):47–55. doi:10.1111/jhn.12217
104. Warschburger P, Kröller K. Childhood overweight and obesity: maternal perceptions of the time for engaging in child weight management. *BMC Public Health.* 2012;12(1):295.
105. Crawford D, Timperio A, Telford A, Salmon J. Parental concerns about childhood obesity and the strategies employed to prevent unhealthy weight gain in children. *Public Health Nutr.* Oct 2006;9(7):889–95. doi:10.1017/phn2005917
106. Neumark-Sztainer DR, Wall MM, Haines JL, Story MT, Sherwood NE, van den Berg PA. Shared risk and protective factors for overweight and disordered eating in

- adolescents. *Am J Prev Med.* Nov 2007;33(5):359–369. doi:10.1016/j.amepre.2007.07.031
107. Patton GC, Selzer R, Coffey C, Carlin JB, Wolfe R. Onset of adolescent eating disorders: population based cohort study over 3 years. *BMJ.* Mar 20 1999;318(7186):765–8. doi:10.1136/bmj.318.7186.765
 108. Carsley S, Pope E, Tu K, Parkin PC, Toulany A, Birken CS. Association between Weight Status and Mental Health Service Utilization in Children and Adolescents. *J Can Acad Child Adolesc Psychiatry.* Nov 2020;29(4):229–240.
 109. Neumark-Sztainer D, Wall M, Haines J, Story M, Eisenberg ME. Why does dieting predict weight gain in adolescents? Findings from project EAT-II: a 5-year longitudinal study. *J Am Diet Assoc.* Mar 2007;107(3):448–55. doi:10.1016/j.jada.2006.12.013
 110. Ebbeling CB, Feldman HA, Chomitz VR, et al. A randomized trial of sugar-sweetened beverages and adolescent body weight. *N Engl J Med.* Oct 11 2012;367(15):1407–16. doi:10.1056/NEJMoa1203388
 111. Sigal RJ, Alberga AS, Goldfield GS, et al. Effects of aerobic training, resistance training, or both on percentage body fat and cardiometabolic risk markers in obese adolescents: the healthy eating aerobic and resistance training in youth randomized clinical trial. *JAMA Pediatr.* Nov 2014;168(11):1006–14. doi:10.1001/jamapediatrics.2014.1392
 112. Jebeile H, Gow ML, Baur LA, Garnett SP, Paxton SJ, Lister NB. Treatment of obesity, with a dietary component, and eating disorder risk in children and adolescents: A systematic review with meta-analysis. *Obes Rev.* Sep 2019;20(9):1287–1298. doi:10.1111/obr.12866
 113. Jebeile H, Gow ML, Baur LA, Garnett SP, Paxton SJ, Lister NB. Association of Pediatric Obesity Treatment, Including a Dietary Component, With Change in Depression and Anxiety: A Systematic Review and Meta-analysis. *JAMA Pediatr.* Sep 16 2019:e192841. doi:10.1001/jamapediatrics.2019.2841
 114. Gow ML, Tee MSY, Garnett SP, et al. Pediatric obesity treatment, self-esteem, and body image: A systematic review with meta-analysis. *Pediatr Obes.* Mar 2020;15(3):e12600. doi:10.1111/ijpo.12600
 115. Butryn ML, Wadden TA. Treatment of overweight in children and adolescents: does dieting increase the risk of eating disorders? *Int J Eat Disord.* May 2005;37(4):285–93. doi:10.1002/eat.20098
 116. Brigden A, Anderson E, Linney C, et al. Digital Behavior Change Interventions for Younger Children With Chronic Health Conditions: Systematic Review. *J Med Internet Res.* Jul 31 2020;22(7):e16924. doi:10.2196/16924
 117. Fit for the future: 10 Year Health Plan for England (2025).
 118. Azevedo LB, Stephenson J, Ells L, et al. The effectiveness of e-health interventions for the treatment of overweight or obesity in children and adolescents: A systematic review and meta-analysis. *Obes Rev.* Feb 2022;23(2):e13373. doi:10.1111/obr.13373
 119. Langarizadeh M, Sadeghi M, As'habi A, Rahmati P, Sheikhtaheri A. Mobile apps for weight management in children and adolescents; An updated systematic review. *Patient Educ Couns.* Sep 2021;104(9):2181–2188. doi:10.1016/j.pec.2021.01.035
 120. Chaplais E, Naughton G, Thivel D, Courteix D, Greene D. Smartphone Interventions for Weight Treatment and Behavioral Change in Pediatric Obesity: A Systematic Review. *Telemed J E Health.* Oct 2015;21(10):822–30. doi:10.1089/tmj.2014.0197

121. Behaviour Change: digital and mobile health interventions (2020).
122. Staiano AE, Shanley JR, Kihm H, et al. Digital Tools to Support Family-Based Weight Management for Children: Mixed Methods Pilot and Feasibility Study. *JMIR Pediatr Parent*. Jan 7 2021;4(1):e24714. doi:10.2196/24714
123. James DCS, Harville C, McQueen DS, Facey JA. "I Want a Program That Looks at My Whole Life." A Focus Group Study on the Ideal Components for an mHealth Weight Management Program for African American Women. *J Acad Nutr Diet*. Jan 2022;122(1):139–148. doi:10.1016/j.jand.2021.06.310
124. Burrows T, Hutchesson M, Chai LK, Rollo M, Skinner G, Collins C. Nutrition Interventions for Prevention and Management of Childhood Obesity: What Do Parents Want from an eHealth Program? *Nutrients*. Dec 15 2015;7(12):10469–79. doi:10.3390/nu7125546
125. Cardel MI, Taveras EM. Let's Not Just Dismiss the Weight Watchers Kurbo App. *Child Obes*. Dec 2020;16(8):547–548. doi:10.1089/chi.2019.29000.car
126. C. H. I help people recover from disordered eating. Don't give your child this app. The New York Times. New York, NY2019.
127. Kepper MM, Walsh-Bailey C, Brownson RC, et al. Development of a Health Information Technology Tool for Behavior Change to Address Obesity and Prevent Chronic Disease Among Adolescents: Designing for Dissemination and Sustainment Using the ORBIT Model. *Front Digit Health*. 2021;3:648777. doi:10.3389/fdgth.2021.648777
128. Pope CM, N. *Qualitative Research in Healthcare, 4th Edition*. Wiley-Blackwell; 2020:272.
129. Disbeschl S, Checkland K, Stutchbury K, Payne R. 'You can mix your methods, but you can't mix your paradigms': a guide to ontology and epistemology for the confused researcher. *Br J Gen Pract*. Jan 1 2026;76(762):36–40. doi:10.3399/BJGP.2025.0390
130. Canty L, Kantrowitz-Gordon I. Understanding Positionality and Reflexivity in Scholarly Writing. *J Midwifery Womens Health*. Jul–Aug 2024;69(4):453–454. doi:10.1111/jmwh.13675
131. Olmos-Vega FM, Stalmeijer RE, Varpio L, Kahlke R. A practical guide to reflexivity in qualitative research: AMEE Guide No. 149. *Med Teach*. Apr 7 2022;1–11. doi:10.1080/0142159X.2022.2057287
132. Sibbald KR, Phelan SK, Beagan BL, Pride TM. Positioning Positionality and Reflecting on Reflexivity: Moving From Performance to Practice. *Qual Health Res*. Mar 28 2025;10497323241309230. doi:10.1177/10497323241309230
133. Nichol B, Rodrigues AM, Tang MY, et al. Mixed Methods Evaluation of the "Train the Trainer" Model for Delivering Core "Making Every Contact Count" (MECC) Training. *Int J Behav Med*. Apr 1 2026;doi:10.1007/s12529-026-10444-8
134. Barriers and facilitators to supporting families with children most at risk of developing excess weight (2020).
135. Observatory C. <https://www.croydonobservatory.org/jsna/>. Accessed 22.10.2025,
136. Lobstein T, Neveux M, Brown T, et al. Social disparities in obesity treatment for children age 3-10 years: A systematic review. *Obes Rev*. Feb 2021;22(2):e13153. doi:10.1111/obr.13153

137. Brown T, Moore TH, Hooper L, et al. Interventions for preventing obesity in children. *Cochrane Database Syst Rev*. Jul 23 2019;7:CD001871. doi:10.1002/14651858.CD001871.pub4
138. Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. *BMJ*. Mar 19 2015;350:h1258. doi:10.1136/bmj.h1258
139. Bandura A. Health promotion by social cognitive means. *Health Educ Behav*. Apr 2004;31(2):143–64. doi:10.1177/1090198104263660
140. Hernan MA, Hernandez-Diaz S. Beyond the intention-to-treat in comparative effectiveness research. *Clin Trials*. Feb 2012;9(1):48–55. doi:10.1177/1740774511420743
141. Arnason A, Langarica N, Dugas LR, Mora N, Luke A, Markossian T. Family-based lifestyle interventions: What makes them successful? A systematic literature review. *Prev Med Rep*. Mar 2021;21:101299. doi:10.1016/j.pmedr.2020.101299
142. Verjans-Janssen SRB, van de Kolk I, Van Kann DHH, Kremers SPJ, Gerards S. Effectiveness of school-based physical activity and nutrition interventions with direct parental involvement on children's BMI and energy balance-related behaviors - A systematic review. *PLoS One*. 2018;13(9):e0204560. doi:10.1371/journal.pone.0204560
143. Cui Z, Truesdale KP, Robinson TN, et al. Recruitment strategies for predominantly low-income, multi-racial/ethnic children and parents to 3-year community-based intervention trials: Childhood Obesity Prevention and Treatment Research (COPTR) Consortium. *Trials*. May 28 2019;20(1):296. doi:10.1186/s13063-019-3418-0
144. Sanders GJ, Marwa WL, Wade B, Gately P. Efficacy of a county-wide schools weight management intervention. *Perspect Public Health*. May 15 2021;17579139211006738. doi:10.1177/17579139211006738
145. Skea ZC, Aceves-Martins M, Robertson C, De Bruin M, Avenell A, team R. Acceptability and feasibility of weight management programmes for adults with severe obesity: a qualitative systematic review. *BMJ Open*. Sep 11 2019;9(9):e029473. doi:10.1136/bmjopen-2019-029473
146. Kulik N, Ennett ST, Ward DS, Bowling JM, Fisher EB, Tate DF. Brief report: A randomized controlled trial examining peer support and behavioral weight loss treatment. *J Adolesc*. Oct 2015;44:117–23. doi:10.1016/j.adolescence.2015.07.010
147. Reece LJ, Bissell P, Copeland RJ. 'I just don't want to get bullied anymore, then I can lead a normal life'; Insights into life as an obese adolescent and their views on obesity treatment. *Health Expect*. Aug 2016;19(4):897–907. doi:10.1111/hex.12385
148. Engstrom A, Abildsnes E, Mildestvedt T. "It's not like a fat camp" - A focus group study of adolescents' experiences on group-based obesity treatment. *Int J Qual Stud Health Well-being*. 2016;11:32744. doi:10.3402/qhw.v11.32744
149. King KM, Puhl RM, Luedicke J, Peterson JL. Eating behaviors, victimization, and desire for supportive intervention among adolescents in weight-loss camps. *Eat Behav*. Dec 2013;14(4):484–7. doi:10.1016/j.eatbeh.2013.08.004
150. Haqq AM, Kebbe M, Tan Q, Manco M, Salas XR. The Complexity and Stigma of Pediatric Obesity. *Child Obes*. Mar 29 2021;doi:10.1089/chi.2021.0003
151. Fagg J, Cole TJ, Cummins S, et al. After the RCT: who comes to a family-based intervention for childhood overweight or obesity when it is implemented at scale in the community? *J Epidemiol Community Health*. Feb 2015;69(2):142–8. doi:10.1136/jech-2014-204155

152. Lucas PJ, Curtis-Tyler K, Arai L, Stapley S, Fagg J, Roberts H. What works in practice: user and provider perspectives on the acceptability, affordability, implementation, and impact of a family-based intervention for child overweight and obesity delivered at scale. *BMC Public Health*. Jun 17 2014;14:614. doi:10.1186/1471-2458-14-614
153. Crane M, Bohn-Goldbaum E, Grunseit A, Bauman A. Using natural experiments to improve public health evidence: a review of context and utility for obesity prevention. *Health Res Policy Syst*. May 18 2020;18(1):48. doi:10.1186/s12961-020-00564-2
154. Cockrell Skinner A, Goldsby TU, Allison DB. Regression to the Mean: A Commonly Overlooked and Misunderstood Factor Leading to Unjustified Conclusions in Pediatric Obesity Research. *Child Obes*. Apr 2016;12(2):155–8. doi:10.1089/chi.2015.0222
155. Sacher PM, Kolotourou M, Chadwick PM, et al. Randomized controlled trial of the MEND program: a family-based community intervention for childhood obesity. *Obesity (Silver Spring)*. Feb 2010;18 Suppl 1:S62–8. doi:10.1038/oby.2009.433
156. Lloyd J, Creanor S, Logan S, et al. Effectiveness of the Healthy Lifestyles Programme (HeLP) to prevent obesity in UK primary-school children: a cluster randomised controlled trial. *Lancet Child Adolesc Health*. Jan 2018;2(1):35–45. doi:10.1016/S2352-4642(17)30151-7
157. Saxena S, Ambler G, Cole TJ, Majeed A. Ethnic group differences in overweight and obese children and young people in England: cross sectional survey. *Arch Dis Child*. Jan 2004;89(1):30–6.
158. Health Survey for England 2019 (2020).
159. Bartholdy S, Allen K, Hodsoll J, et al. Identifying disordered eating behaviours in adolescents: how do parent and adolescent reports differ by sex and age? *Eur Child Adolesc Psychiatry*. Jun 2017;26(6):691–701. doi:10.1007/s00787-016-0935-1
160. Ahmad A, Little M, Piernas C, Jebb S. Trends in weight loss attempts among children in England. *Arch Dis Child*. Jul 18 2022;107(10):896–901. doi:10.1136/archdischild-2021-323493
161. Halford JCG, Brown A, Clare K, et al. Insights from the ACTION Teens Study: a survey of adolescents living with obesity, their caregivers and healthcare professionals in the UK. *BMJ Open*. Jul 23 2024;14(7):e086391. doi:10.1136/bmjopen-2024-086391
162. Kenney MK, Lebrun-Harris LA, Vladutiu CJ, Kogan MD. Parental Concerns About Child Weight Among 10-17-Year Olds With Overweight/Obesity: A Family Ecological Model. *Acad Pediatr*. Dec 30 2020;doi:10.1016/j.acap.2020.12.008
163. Rhee KE, De Lago CW, Arscott-Mills T, Mehta SD, Davis RK. Factors associated with parental readiness to make changes for overweight children. *Pediatrics*. Jul 2005;116(1):e94–101. doi:10.1542/peds.2004-2479
164. Moore LC, Harris CV, Bradlyn AS. Exploring the relationship between parental concern and the management of childhood obesity. *Matern Child Health J*. May 2012;16(4):902–8. doi:10.1007/s10995-011-0813-x
165. Puhl RM, Lessard LM, Pudney EV, Foster GD, Cardel MI. Motivations for engaging in or avoiding conversations about weight: Adolescent and parent perspectives. *Pediatr Obes*. Dec 2022;17(12):e12962. doi:10.1111/ijpo.12962
166. Gillison FB, Lorenc AB, Sleddens EF, Williams SL, Atkinson L. Can it be harmful for parents to talk to their child about their weight? A meta-analysis. *Prev Med*. Dec 2016;93:135–146. doi:10.1016/j.ypmed.2016.10.010

167. Dailey RM, Thompson CM, Romo LK. Mother-teen communication about weight management. *Health Commun.* 2014;29(4):384–97. doi:10.1080/10410236.2012.759052
168. Nyanzi LA, Summerbell CD, Ells L, Shucksmith J. Parental response to a letter reporting child overweight measured as part of a routine national programme in England: results from interviews with parents. *BMC Public Health.* Aug 20 2016;16:846. doi:10.1186/s12889-016-3481-3
169. Nuffield Department of Primary Care Health Sciences UoO. Health Experience Insights: Health and Weight (young people). <https://hexioxacuk/health-and-weight/overview>. 2024;
170. Pinto A, Rodriguez A, Smith J. Researching sensitive topics in healthcare. *Evid Based Nurs.* Apr 2022;25(2):41–43. doi:10.1136/ebnurs-2021-103501
171. Malterud K, Siersma VD, Guassora AD. Sample Size in Qualitative Interview Studies: Guided by Information Power. *Qual Health Res.* Nov 2016;26(13):1753–1760. doi:10.1177/1049732315617444
172. Vasileiou K, Barnett J, Thorpe S, Young T. Characterising and justifying sample size sufficiency in interview-based studies: systematic analysis of qualitative health research over a 15-year period. *BMC Med Res Methodol.* Nov 21 2018;18(1):148. doi:10.1186/s12874-018-0594-7
173. Braun V, Clarke V. Is thematic analysis used well in health psychology? A critical review of published research, with recommendations for quality practice and reporting. *Health Psychol Rev.* Dec 2023;17(4):695–718. doi:10.1080/17437199.2022.2161594
174. Braun V, Clarke V. A critical review of the reporting of reflexive thematic analysis in Health Promotion International. *Health Promot Int.* Jun 1 2024;39(3)doi:10.1093/heapro/daae049
175. Kiger ME, Varpio L. Thematic analysis of qualitative data: AMEE Guide No. 131. *Med Teach.* Aug 2020;42(8):846–854. doi:10.1080/0142159X.2020.1755030
176. Clarke VBaV. One size fits all? What counts as quality practice in (reflexive) thematic analysis? *Qualitative Research In Psychology.* 2021;18:2:328–352. doi:10.1080/14780887.2020.1769238
177. Braun V, Clarke V. Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a knowing researcher. *Int J Transgend Health.* 2023;24(1):1–6. doi:10.1080/26895269.2022.2129597
178. Fringer A. [Qualitative data analysis: coding versus content analysis]. *Pflege.* Aug 2013;26(4):281–2. Qualitative datenanalyse: coding versus inhaltsanalyse. doi:10.1024/1012-5302/a000306
179. Stage VC, Cooke NK, McMillen JD, Dixon JB, Goodell LS. Practical Qualitative Research Strategies: An Introduction to Data Analysis and Rigorous Coding Practices. *J Nutr Educ Behav.* May 23 2026;doi:10.1016/j.jneb.2026.04.008
180. Durkin J, Jackson D, Usher K. Qualitative research interviewing: reflections on power, silence and assumptions. *Nurse Res.* Dec 16 2020;28(4):31–35. doi:10.7748/nr.2020.e1725
181. Ziebland S, McPherson A. Making sense of qualitative data analysis: an introduction with illustrations from DIPEX (personal experiences of health and illness). *Med Educ.* May 2006;40(5):405–14. doi:10.1111/j.1365-2929.2006.02467.x

182. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care*. Dec 2007;19(6):349–57. doi:10.1093/intqhc/mzm042
183. Carapeto MJ, Domingos R, Veiga G. Is the Effect of Body Dissatisfaction on Depressive Symptoms Dependent on Weight Status? A Study with Early-to-Middle Adolescents. *Eur J Investig Health Psychol Educ*. Nov 3 2020;10(4):1020–1034. doi:10.3390/ejihpe10040072
184. Patalay P, Hardman CA. Comorbidity, Codevelopment, and Temporal Associations Between Body Mass Index and Internalizing Symptoms From Early Childhood to Adolescence. *JAMA Psychiatry*. Jul 1 2019;76(7):721–729. doi:10.1001/jamapsychiatry.2019.0169
185. Creese H, Saxena S, Nicholls D, Pascual Sanchez A, Hargreaves D. The role of dieting, happiness with appearance, self-esteem, and bullying in the relationship between mental health and body-mass index among UK adolescents: a longitudinal analysis of the Millennium Cohort Study. *EClinicalMedicine*. Jun 2023;60:101992. doi:10.1016/j.eclinm.2023.101992
186. Jarman HK, Marques MD, McLean SA, Slater A, Paxton SJ. Social media, body satisfaction and well-being among adolescents: A mediation model of appearance-ideal internalization and comparison. *Body Image*. Mar 2021;36:139–148. doi:10.1016/j.bodyim.2020.11.005
187. Orben A, Dienlin T, Przybylski AK. Social media's enduring effect on adolescent life satisfaction. *Proc Natl Acad Sci U S A*. May 21 2019;116(21):10226–10228. doi:10.1073/pnas.1902058116
188. de Vries DA, Peter J, de Graaf H, Nikken P. Adolescents' Social Network Site Use, Peer Appearance-Related Feedback, and Body Dissatisfaction: Testing a Mediation Model. *J Youth Adolesc*. Jan 2016;45(1):211–24. doi:10.1007/s10964-015-0266-4
189. Holland G, Tiggemann M. A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image*. Jun 2016;17:100–10. doi:10.1016/j.bodyim.2016.02.008
190. Kelly Y, Zilanawala A, Booker C, Sacker A. Social Media Use and Adolescent Mental Health: Findings From the UK Millennium Cohort Study. *EClinicalMedicine*. Dec 2018;6:59–68. doi:10.1016/j.eclinm.2018.12.005
191. Choukas-Bradley S, Roberts SR, Maheux AJ, Nesi J. The Perfect Storm: A Developmental-Sociocultural Framework for the Role of Social Media in Adolescent Girls' Body Image Concerns and Mental Health. *Clin Child Fam Psychol Rev*. Dec 2022;25(4):681–701. doi:10.1007/s10567-022-00404-5
192. Fardouly J. Potential effects of the social media age ban in Australia for children younger than 16 years. *Lancet Digit Health*. Apr 2025;7(4):e235–e236. doi:10.1016/j.landig.2025.01.016
193. Beyens I, Keijsers L, Coyne SM. Social media, parenting, and well-being. *Curr Opin Psychol*. Oct 2022;47:101350. doi:10.1016/j.copsyc.2022.101350
194. Hughes A, Grey E, Hagherty A, et al. Weight-related bullying in schools: a review of school anti-bullying policies. *BMC Public Health*. May 30 2025;25(1):2006. doi:10.1186/s12889-025-23170-9
195. Gorlick JC, Gorman CV, Weeks HM, Pearlman AT, Schvey NA, Bauer KW. "I Feel Like Less of a Mom": Experiences of Weight Stigma by Association among Mothers of

- Children with Overweight and Obesity. *Child Obes.* Jan 2021;17(1):68–75. doi:10.1089/chi.2020.0199
196. Puhl RM, Luedicke J, Depierre JA. Parental concerns about weight-based victimization in youth. *Child Obes.* Dec 2013;9(6):540–8. doi:10.1089/chi.2013.0064
 197. Czepczor-Bernat K, Modrzejewska J, Modrzejewska A, Calandri E, Gattino S, Rollero C. Dyadic Predictors of Child Body Shame in a Polish and Italian Sample. *Int J Environ Res Public Health.* Jul 16 2022;19(14)doi:10.3390/ijerph19148659
 198. Pudney EV, Himmelstein MS, Puhl RM. The role of weight stigma in parental weight talk. *Pediatr Obes.* Oct 2019;14(10):e12534. doi:10.1111/ijpo.12534
 199. Health Survey for England 2015 and 2016 (2018).
 200. Puhl RM, Himmelstein MS. A Word to the Wise: Adolescent Reactions to Parental Communication about Weight. *Child Obes.* Jul 2018;14(5):291–301. doi:10.1089/chi.2018.0047
 201. Neumark-Sztainer D, Bauer KW, Friend S, Hannan PJ, Story M, Berge JM. Family weight talk and dieting: how much do they matter for body dissatisfaction and disordered eating behaviors in adolescent girls? *J Adolesc Health.* Sep 2010;47(3):270–6. doi:10.1016/j.jadohealth.2010.02.001
 202. Berge JM, Maclehose R, Loth KA, Eisenberg M, Bucchianeri MM, Neumark-Sztainer D. Parent conversations about healthful eating and weight: associations with adolescent disordered eating behaviors. *JAMA Pediatr.* Aug 1 2013;167(8):746–53. doi:10.1001/jamapediatrics.2013.78
 203. Lawrence SE, Lessard LM, Puhl RM, Foster GD, Cardel MI. "Look beyond the weight and accept me": Adolescent perspectives on parental weight communication. *Body Image.* Jun 2023;45:11–19. doi:10.1016/j.bodyim.2023.01.006
 204. Puhl RM, Lessard LM, Foster GD, Cardel MI. Parent-child communication about weight: Priorities for parental education and support. *Pediatr Obes.* Jun 2023;18(6):e13027. doi:10.1111/ijpo.13027
 205. Gillison FB, Grey EB, Baber F, Chater A, Atkinson L, Gahagan A. The systematic development of guidance for parents on talking to children of primary school age about weight. *BMC Public Health.* Sep 4 2023;23(1):1704. doi:10.1186/s12889-023-16527-5
 206. Baber F, Gillison FB, Grey EB. The acceptability of evidence-informed guidance for parents in talking to their children about weight. *BMC Public Health.* Jul 14 2023;23(1):1357. doi:10.1186/s12889-023-16267-6
 207. Twomey B, Gillison F. The acceptability and utility of parental guidance on weight-talk with children for general practitioners: a qualitative study. *BJGP Open.* Oct 29 2025;doi:10.3399/BJGPO.2025.0087
 208. Yerges AL, Snethen JA, Carrel AL. Female adolescents with overweight and obesity share their perspectives on the clinical setting and weight management. *Clin Obes.* Feb 2021;11(1):e12415. doi:10.1111/cob.12415
 209. Cohen J, Brennan AM, Alexander S, Henderson J, Graham C, Baur LA. Assessment of Clinicians' Views for Managing Children with Obesity in the Primary, Secondary, and Tertiary Settings. *Child Obes.* Dec 2019;15(8):510–518. doi:10.1089/chi.2019.0106
 210. Hersch DE, Uy MJA, Ngaw SM, Loth KA. Primary care providers' perspectives on initiating childhood obesity conversations: a qualitative study. *Fam Pract.* Jul 28 2021;38(4):460–467. doi:10.1093/fampra/cmaa144

211. Darling KE, Sato AF, van Dulmen M, Flessner C, Putt G. Development of a Measure to Assess Parent Perceptions of Barriers to Child Weight Management. *Child Obes.* Feb/Mar 2018;14(2):89–98. doi:10.1089/chi.2017.0171
212. Kulik NL, Thomas EM, Iovan S, McKeough M, Kendzierski S, Leatherwood S. Access to primary care child weight management programs: Urban parent barriers and facilitators to participation. *J Child Health Care.* Dec 2017;21(4):509–521. doi:10.1177/1367493517728401
213. Warr W, Aveyard P, Albury C, et al. A systematic review and thematic synthesis of qualitative studies exploring GPs' and nurses' perspectives on discussing weight with patients with overweight and obesity in primary care. *Obes Rev.* Apr 2021;22(4):e13151. doi:10.1111/obr.13151
214. Harriger JA, Evans JA, Thompson JK, Tylka TL. The dangers of the rabbit hole: Reflections on social media as a portal into a distorted world of edited bodies and eating disorder risk and the role of algorithms. *Body Image.* Jun 2022;41:292–297. doi:10.1016/j.bodyim.2022.03.007
215. Every Mind Matters (Crown Copyright) (2021).
216. COVID-19 mental health and wellbeing recovery action plan (2021).
217. Utter J, Denny S, Peiris-John R, Moselen E, Dyson B, Clark T. Family Meals and Adolescent Emotional Well-Being: Findings From a National Study. *J Nutr Educ Behav.* Jan 2017;49(1):67–72 e1. doi:10.1016/j.jneb.2016.09.002
218. Schnettler B, Grunert KG, Lobos G, Miranda-Zapata E, Denegri M, Hueche C. Maternal Food-Related Practices, Quality of Diet, and Well-Being: Profiles of Chilean Mother-Adolescent Dyads. *J Nutr Educ Behav.* Sep 2018;50(8):776–787. doi:10.1016/j.jneb.2018.03.003
219. Hill AJ, Weaver C, Blundell JE. Dieting concerns of 10-year-old girls and their mothers. *Br J Clin Psychol.* Sep 1990;29(3):346–8. doi:10.1111/j.2044-8260.1990.tb00894.x
220. Bauer KW, Bucchianeri MM, Neumark-Sztainer D. Mother-reported parental weight talk and adolescent girls' emotional health, weight control attempts, and disordered eating behaviors. *J Eat Disord.* 2013;1:45. doi:10.1186/2050-2974-1-45
221. Semaglutide for managing overweight and obesity in young people aged 12 to 17 years (terminated appraisal) (2023).
222. Kotecha P, Huang W, Yeh YY, et al. Efficacy and Safety of GLP-1 RAs in Children and Adolescents With Obesity or Type 2 Diabetes: A Systematic Review and Meta-Analysis. *JAMA Pediatr.* Sep 15 2025;doi:10.1001/jamapediatrics.2025.3243
223. Ferreira F, Seoane G, Senra C. Toward understanding the role of body dissatisfaction in the gender differences in depressive symptoms and disordered eating: a longitudinal study during adolescence. *J Adolesc.* Jan 2014;37(1):73–84. doi:10.1016/j.adolescence.2013.10.013
224. Al Sabbah H, Vereecken CA, Elgar FJ, et al. Body weight dissatisfaction and communication with parents among adolescents in 24 countries: international cross-sectional survey. *BMC Public Health.* Feb 6 2009;9:52. doi:10.1186/1471-2458-9-52
225. Bornioli A, Lewis-Smith H, Slater A, Bray I. Body dissatisfaction predicts the onset of depression among adolescent females and males: a prospective study. *J Epidemiol Community Health.* Dec 7 2020;doi:10.1136/jech-2019-213033
226. Vuong AT, Jarman HK, Doley JR, McLean SA. Social Media Use and Body Dissatisfaction in Adolescents: The Moderating Role of Thin- and Muscular-Ideal

- Internalisation. *Int J Environ Res Public Health*. Dec 15 2021;18(24)doi:10.3390/ijerph182413222
227. Puhl RM, Lessard LM. Weight Stigma in Youth: Prevalence, Consequences, and Considerations for Clinical Practice. *Curr Obes Rep*. Dec 2020;9(4):402–411. doi:10.1007/s13679-020-00408-8
228. Little M, Jebb SA, Aveyard P. Adolescent and parental views on weight and weight management: a qualitative study. *Arch Dis Child*. Feb 6 2025;doi:10.1136/archdischild-2024-327306
229. Mansfield KL, Puntis S, Soneson E, Cipriani A, Geulayov G, Fazel M. Study protocol: the OxWell school survey investigating social, emotional and behavioural factors associated with mental health and well-being. *BMJ Open*. Dec 8 2021;11(12):e052717. doi:10.1136/bmjopen-2021-052717
230. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies. *Int J Surg*. Dec 2014;12(12):1495–9. doi:10.1016/j.ijsu.2014.07.013
231. Soneson E, O'Leary S, Fazel M. Trans and gender diverse identities in adolescent health research: making the most of imperfect data. *BMJ Ment Health*. Nov 8 2024;27(1)doi:10.1136/bmjment-2024-301150
232. Ethnic group variable: Census 2021 (Office for National Statistics) (2023).
233. K McFarlane FA, A Westall and R Beddoe. *Report on the 8th Annual Child and Family Poverty Survey 2024*.
234. Grammer AC, Byrne ME, Pearlman AT, Klein DA, Schvey NA. Overweight and obesity in sexual and gender minority adolescents: A systematic review. *Obes Rev*. Oct 2019;20(10):1350–1366. doi:10.1111/obr.12906
235. Jones BA, Haycraft E, Murjan S, Arcelus J. Body dissatisfaction and disordered eating in trans people: A systematic review of the literature. *Gender dysphoria and gender incongruence*. 2018:93–106.
236. Cusack CE, Iampieri AO, Galupo MP. “I’m still not sure if the eating disorder is a result of gender dysphoria”: Trans and nonbinary individuals’ descriptions of their eating and body concerns in relation to their gender. *Psychology of sexual orientation and gender diversity*. 2022;9(4):422.
237. Fowler LA, Wang Y, Wall C, et al. "If I can accept my queerness, I can accept my body as it is": Understanding weight-related perspectives and stigma from sexual minority women. *Front Psychiatry*. 2025;16:1687680. doi:10.3389/fpsy.2025.1687680
238. Wardle J, Johnson F. Weight and dieting: examining levels of weight concern in British adults. *Int J Obes Relat Metab Disord*. Aug 2002;26(8):1144–9. doi:10.1038/sj.ijo.0802046
239. Olson KL, Lillis J, Panza E, Wing RR, Quinn DM, Puhl RR. Body shape concerns across racial and ethnic groups among adults in the United States: More similarities than differences. *Body Image*. Dec 2020;35:108–113. doi:10.1016/j.bodyim.2020.08.013
240. Kardelen Cakici ZM, Merve Denizci Nazligul. A Systematic Review of Body Image and Related Psychological Concepts: Does Ethnicity Matter? *Current Approaches in Psychiatry*. 2021;13(4):707–725. doi:10.18863/pgy.869244
241. Ojala K, Vereecken C, Valimaa R, et al. Attempts to lose weight among overweight and non-overweight adolescents: a cross-national survey. *Int J Behav Nutr Phys Act*. Oct 14 2007;4:50. doi:10.1186/1479-5868-4-50

242. Patte KA, Leatherdale ST. A cross-sectional analysis examining the association between dieting behaviours and alcohol use among secondary school students in the COMPASS study. *J Public Health (Oxf)*. Jun 1 2017;39(2):321–329. doi:10.1093/pubmed/fdw034
243. Houle-Johnson SA, Kakinami L. Do sex differences in reported weight loss intentions and behaviours persist across demographic characteristics and weight status in youth? A systematic review. *BMC Public Health*. Dec 4 2018;18(1):1343. doi:10.1186/s12889-018-6179-x
244. Harnois-Leblanc S, Van Hulst A, Sabiston CM, et al. Self-reported weight loss attempts and weight-related stress in childhood: Heightening the risk of obesity in early adolescence. *Int J Eat Disord*. May 2021;54(5):764–772. doi:10.1002/eat.23474
245. Barker ET, Bornstein MH. Global Self-Esteem, Appearance Satisfaction, and Self-Reported Dieting in Early Adolescence. *J Early Adolesc*. Apr 1 2010;30(2):205–224. doi:10.1177/0272431609332936
246. Ling J, Stommel M, Choi SH. Attempts to Lose Weight Among US Children: Importance of Weight Perceptions from Self, Parents, and Health Professionals. *Obesity (Silver Spring)*. Mar 2018;26(3):597–605. doi:10.1002/oby.22106
247. Story M, Stevens J, Evans M, et al. Weight loss attempts and attitudes toward body size, eating, and physical activity in American Indian children: relationship to weight status and gender. *Obes Res*. Jun 2001;9(6):356–63. doi:10.1038/oby.2001.46
248. Umlauff L. The association of socio-economic determinants, dietary intake, self-perception and weight control behaviours with childhood overweight and obesity: A secondary analysis of the National Health and Nutrition Examination Survey (NHANES) 2013-2014 among children age 2-19 in the United States. 2017.
249. Gluck ME, Geliebter A. Racial/ethnic differences in body image and eating behaviors. *Eat Behav*. Summer 2002;3(2):143–51. doi:10.1016/s1471-0153(01)00052-6
250. Warren J, Smalley B, Barefoot N. Higher Motivation for Weight Loss in African American than Caucasian Rural Patients with Hypertension and/or Diabetes. *Ethn Dis*. Jan 21 2016;26(1):77–84. doi:10.18865/ed.26.1.77
251. Erdogan EG, Duru P. A Comprehensive Examination of Poverty, Health-Seeking Behavior, and Access to Health Services With a Mixed-Methods Approach. *Public Health Nurs*. Oct 16 2025;doi:10.1111/phn.70028
252. Chartier M, Stoep AV, McCauley E, Herting JR, Tracy M, Lymp J. Passive versus active parental permission: implications for the ability of school-based depression screening to reach youth at risk. *J Sch Health*. Mar 2008;78(3):157–64; quiz 184–6. doi:10.1111/j.1746-1561.2007.00278.x
253. Sonesson E, Fazel M, Goli PS, White SR. Are Adolescents Sensitive About Sensitive Data? Exploring Student Concerns About Privacy, Confidentiality, and Data Use in Health Research. *J Adolesc Health*. Jun 2025;76(6):1008–1017. doi:10.1016/j.jadohealth.2025.03.004
254. Anna Lindqvist MGSEAR. What is gender, anyway: a review of the options for operationalising gender. *Psychology and Sexuality* 2021;12(4):332–344. doi:<https://doi.org/10.1080/19419899.2020.1729844>
255. Carstairs V. Deprivation indices: their interpretation and use in relation to health. *J Epidemiol Community Health*. Dec 1995;49 Suppl 2(Suppl 2):S3–8. doi:10.1136/jech.49.suppl_2.s3

256. Elgar FJ, Xie, Annie, Pfortner, Timo-Kolja, White, James and Pickett, Kate E. Assessing the view from bottom: How to measure socioeconomic position and relative deprivation in adolescents. *SAGE Research Methods Cases*. 2017;(2)doi:<http://dx.doi.org/10.4135/9781526406347>
257. Bornioli A, Lewis-Smith H, Smith A, Slater A, Bray I. Adolescent body dissatisfaction and disordered eating: Predictors of later risky health behaviours. *Soc Sci Med*. Oct 2019;238:112458. doi:10.1016/j.socscimed.2019.112458
258. de Jong M, Jansen N, van Middelkoop M. A systematic review of patient barriers and facilitators for implementing lifestyle interventions targeting weight loss in primary care. *Obes Rev*. Aug 2023;24(8):e13571. doi:10.1111/obr.13571
259. Kelleher E, Davoren MP, Harrington JM, Shiely F, Perry IJ, McHugh SM. Barriers and facilitators to initial and continued attendance at community-based lifestyle programmes among families of overweight and obese children: a systematic review. *Obes Rev*. Feb 2017;18(2):183–194. doi:10.1111/obr.12478
260. Eldridge SM, Lancaster GA, Campbell MJ, et al. Defining Feasibility and Pilot Studies in Preparation for Randomised Controlled Trials: Development of a Conceptual Framework. *PLoS One*. 2016;11(3):e0150205. doi:10.1371/journal.pone.0150205
261. Skivington K, Matthews L, Simpson SA, et al. A new framework for developing and evaluating complex interventions: update of Medical Research Council guidance. *BMJ*. Sep 30 2021;374:n2061. doi:10.1136/bmj.n2061
262. Eldridge SM, Chan CL, Campbell MJ, et al. CONSORT 2010 statement: extension to randomised pilot and feasibility trials. *Pilot Feasibility Stud*. 2016;2:64. doi:10.1186/s40814-016-0105-8
263. Moksnes UK, Espnes GA, Eilertsen MEB, Bjornsen HN, Ringdal R, Haugan G. Validation of Rosenberg self-esteem scale among Norwegian adolescents - psychometric properties across samples. *BMC Psychol*. Sep 27 2024;12(1):506. doi:10.1186/s40359-024-02004-0
264. Willmott TJ, Pang B, Rundle-Thiele S. Capability, opportunity, and motivation: an across contexts empirical examination of the COM-B model. *BMC Public Health*. May 29 2021;21(1):1014. doi:10.1186/s12889-021-11019-w
265. Atkins L, Francis J, Islam R, et al. A guide to using the Theoretical Domains Framework of behaviour change to investigate implementation problems. *Implement Sci*. Jun 21 2017;12(1):77. doi:10.1186/s13012-017-0605-9
266. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci*. Apr 23 2011;6:42. doi:10.1186/1748-5908-6-42
267. Hunot C, Fildes A, Croker H, Llewellyn CH, Wardle J, Beeken RJ. Appetitive traits and relationships with BMI in adults: Development of the Adult Eating Behaviour Questionnaire. *Appetite*. Oct 1 2016;105:356–63. doi:10.1016/j.appet.2016.05.024
268. Johnson F, Wardle J, Griffith J. The Adolescent Food Habits Checklist: reliability and validity of a measure of healthy eating behaviour in adolescents. *Eur J Clin Nutr*. Jul 2002;56(7):644–9. doi:10.1038/sj.ejcn.1601371
269. Vaismoradi M, Turunen H, Bondas T. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nurs Health Sci*. Sep 2013;15(3):398–405. doi:10.1111/nhs.12048

270. Kouvari M, Karipidou M, Tsiampalis T, et al. Digital Health Interventions for Weight Management in Children and Adolescents: Systematic Review and Meta-analysis. *J Med Internet Res*. Feb 14 2022;24(2):e30675. doi:10.2196/30675
271. Tugault-Lafleur CN, De-Jongh Gonzalez O, Macdonald J, et al. Efficacy of the Aim2Be Intervention in Changing Lifestyle Behaviors Among Adolescents With Overweight and Obesity: Randomized Controlled Trial. *J Med Internet Res*. Apr 25 2023;25:e38545. doi:10.2196/38545
272. Melo GLR, Santo RE, Mas Clavel E, et al. Digital dietary interventions for healthy adolescents: A systematic review of behavior change techniques, engagement strategies, and adherence. *Clin Nutr*. Feb 2025;45:176–192. doi:10.1016/j.clnu.2025.01.012
273. Martin A, Caon M, Adorni F, et al. A Mobile Phone Intervention to Improve Obesity-Related Health Behaviors of Adolescents Across Europe: Iterative Co-Design and Feasibility Study. *JMIR Mhealth Uhealth*. Mar 2 2020;8(3):e14118. doi:10.2196/14118
274. Cordier A. Teenagers no longer answer the phone: is it a lack of manners or a new trend? *The Conversation*.
275. Luppino G, Wasniewska M, Casto C, et al. Treating Children and Adolescents with Obesity: Predictors of Early Dropout in Pediatric Weight-Management Programs. *Children (Basel)*. Feb 5 2024;11(2)doi:10.3390/children11020205
276. Desmet M, Fillon A, Thivel D, Tanghe A, Braet C. Attrition rate and predictors of a monitoring mHealth application in adolescents with obesity. *Pediatr Obes*. Nov 2023;18(11):e13071. doi:10.1111/ijpo.13071
277. Jong ST, Stevenson R, Winpenny EM, Corder K, van Sluijs EMF. Recruitment and retention into longitudinal health research from an adolescent perspective: a qualitative study. *BMC Med Res Methodol*. Jan 16 2023;23(1):16. doi:10.1186/s12874-022-01802-7
278. Children looked after in England including adoption: 2023 to 2024 (2024).
279. Alderson H, Brown R, Smart D, Lingam R, Dovey-Pearce G. 'You've come to children that are in care and given us the opportunity to get our voices heard': The journey of looked after children and researchers in developing a Patient and Public Involvement group. *Health Expect*. Aug 2019;22(4):657–665. doi:10.1111/hex.12904
280. Davidow JY, Foerde K, Galvan A, Shohamy D. An Upside to Reward Sensitivity: The Hippocampus Supports Enhanced Reinforcement Learning in Adolescence. *Neuron*. Oct 5 2016;92(1):93–99. doi:10.1016/j.neuron.2016.08.031
281. Galvan A. Adolescent development of the reward system. *Front Hum Neurosci*. 2010;4:6. doi:10.3389/neuro.09.006.2010
282. Yan T, Su C, Xue W, Hu Y, Zhou H. Mobile phone short video use negatively impacts attention functions: an EEG study. *Front Hum Neurosci*. 2024;18:1383913. doi:10.3389/fnhum.2024.1383913
283. Fedele DA, Cushing CC, Fritz A, Amaro CM, Ortega A. Mobile Health Interventions for Improving Health Outcomes in Youth: A Meta-analysis. *JAMA Pediatr*. May 1 2017;171(5):461–469. doi:10.1001/jamapediatrics.2017.0042
284. Ekstrom S, Kull I, Nilsson S, Bergstrom A. Web-based self-reported height, weight, and body mass index among Swedish adolescents: a validation study. *J Med Internet Res*. Mar 18 2015;17(3):e73. doi:10.2196/jmir.3947
285. Thornton L, Osman B, Champion K, et al. Measurement Properties of Smartphone Approaches to Assess Diet, Alcohol Use, and Tobacco Use: Systematic Review. *JMIR Mhealth Uhealth*. Feb 17 2022;10(2):e27337. doi:10.2196/27337

286. Whatnall MC, Kolokotroni KZ, Fozard TE, et al. How is online self-reported weight compared with image-captured weight? A comparative study using data from an online longitudinal study of young adults. *Am J Clin Nutr.* Aug 2023;118(2):452–458. doi:10.1016/j.ajcnut.2023.05.029
287. Lachin JM. Fallacies of last observation carried forward analyses. *Clin Trials.* Apr 2016;13(2):161–8. doi:10.1177/1740774515602688
288. Darling KE, Ruzicka EB, Shields C, Putt GE, Sato AF. Barriers to weight management in adolescence: Measure adaptation among adolescents presenting to an interdisciplinary weight management clinic. *J Child Health Care.* Apr 18 2022;13674935221087573. doi:10.1177/13674935221087573
289. Lawrence SM, Saab MM, Savage E, Hegarty J, FitzGerald S. Adolescents' perspectives and experiences of accessing general practitioner services: A systematic review. *J Child Health Care.* Sep 2025;29(3):734–754. doi:10.1177/13674935241239837
290. Wyatt KA, Bell J, Cooper J, et al. Involvement of children and young people in the conduct of health research: A rapid umbrella review. *Health Expect.* Jun 2024;27(3):e14081. doi:10.1111/hex.14081
291. Rouncefield-Swales A, Harris J, Carter B, Bray L, Bewley T, Martin R. Children and young people's contributions to public involvement and engagement activities in health-related research: A scoping review. *PLoS One.* 2021;16(6):e0252774. doi:10.1371/journal.pone.0252774
292. Trust NKCHF. <https://www.kentcht.nhs.uk/community-health-online/jean-ravenna-receives-recognition-award/>. Accessed 27.01.2026, 2026.
293. National mapping of weight management services: Provision of tier 2 and tier 3 services in England (2015).
294. A Guide to Delivering and Commissioning Tier 2 Weight Management Services for Children and their Families (2017).
295. Malone Gill S, Hayes O, Corcoran Y, et al. Protocol for an umbrella review of the state-of-science on public and patient involvement in health and social care research with children, young people and families. *HRB Open Res.* 2025;8:78. doi:10.12688/hrbopenres.14142.1
296. Reed H, Couturiaux D, Davis M, et al. Co-production as an Emerging Methodology for Developing School-Based Health Interventions with Students Aged 11-16: Systematic Review of Intervention Types, Theories and Processes and Thematic Synthesis of Stakeholders' Experiences. *Prev Sci.* May 2021;22(4):475–491. doi:10.1007/s11121-020-01182-8
297. Childhood Obesity: A plan for action (Chapter 2) (2018).

APPENDICES

Appendix 4.1: Secondary School Survey Results

Question	Results	Quotes
Do you consider yourself to be above a healthy weight?	Yes = 17 (32%) No = 25 (47%) Not Sure = 11 (21%)	<i>"Maybe – I am not exactly sure what a healthy weight is"</i> <i>"No - I personally find myself to be of a similar size to those around me and I have used the BMI to assure this"</i> <i>"Yes – I have been told since I was a child that I am overweight"</i>
I feel like there is pressure to be a certain weight	Strongly Agree = 20 (38%) Agree = 31 (58%) Maybe = 2 (4%) Disagree = 0 Strongly Disagree = 0	<i>"I feel that all the time people talk about what they ate or how they aren't eating much or their diet plans and sometimes it can be overwhelming. If you don't look a certain way like the majority of people, some people might strongly suggest you to go to the gym of lose weight"</i> <i>"Online pressure and peer pressure, especially at school, people judge you for your weight"</i> <i>"With social media, and influencers you see on there, it can feel like you have to look like them and if you don't your worth less"</i>
My weight makes my mental health worse	Strongly Agree = 8 (15%) Agree = 27 (51%) Maybe = 10 (19%) Disagree = 7 (13%) Strongly Disagree = 1 (2%)	<i>"Some days it effects me more than other days but when I do feel bad it's hard to get out of that feeling"</i> <i>"When my weight on a weighing scale appears high then I feel guilt and shame"</i>

		<i>"As I am confident in my weight, I do not feel it negatively impacts my mental health"</i> <i>"Pressure from others making you not feel good enough due to weight can affect mental health, it is more pressure and expectations than the actual weight itself."</i>
I would like people to discuss my weight with me if it was done in a kind and supportive manner	Strongly Agree = 4 (8%) Agree = 19 (36%) Maybe = 12 (23%) Disagree = 15 (28%) Strongly Disagree = 3 (6%)	<i>"I would feel ashamed and nervous even so. I would still be defensive that kind of talk scares me."</i> <i>"I personally would find it very awkward and uncomfortable"</i> <i>"If it would help to reduce negative views on myself and be constructive, I think I would benefit from this."</i> <i>"If it were for health reasons I feel as though I may benefit from discussing my weight so I am healthy"</i>
If you were concerned about your weight, where would you go for support? (tick all that apply)	Friend = 18 (34%) GP = 22 (42%) Website = 20 (38%) Social media = 7 (13%) Parent = 24 (45%) Nobody = 3 (6%)	<i>"Because my parents would give me kind advice and make me feel loved about myself"</i> <i>"Website – It almost seems the easiest option"</i> <i>"Social Media or Website – its always awkward and uncomfortable talking to people you know"</i> <i>"I feel that people my age also struggle with things related to this, and hence talking to them may be triggering or upsetting to them so I wouldn't talk to them. My parents may not understand and the GP usually takes a lot of time to get around."</i>

How would you feel if your parents brought up your weight with you?	n/a	<i>“It would feel very demoralising as it would indicate they had an issue with it and think you need to change. It can lead to various problems such as a loss in self-esteem/confidence and eating disorders.”</i> <i>“This has happened to me and I felt very attacked and like it wasn’t a safe place to share my concerns. It was more of a confrontation than a conversation which was quite upsetting.”</i> <i>“I would not mind at all, parents are there to look after you and ensure that you are healthy, if they were to bring up weight it would be in my best interests”</i>
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Appendix 4.2: Qualitative Study Participant Information Sheets

Nuffield Department of Primary Care Health Sciences, University of Oxford
Radcliffe Observatory Quarter, Woodstock Road, Oxford, OX2 6GG

Principal Investigator: Professor Paul Aveyard
Student: Melissa Little
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk



Parental and Adolescent views on Weight Management in Adolescents

PARTICIPANT INFORMATION SHEET

Central University Research Ethics Committee Approval Reference: R77048/RE002

1. Introductory paragraph

You are being invited to take part in a research project. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with 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 you wish to take part.

2. Why is this research being conducted?

Currently in England 1 in 3 young people are overweight or obese. We are trying to find out more about how parents of teenagers who struggle with their weight can feel better supported to manage their child's weight. This information will help us to provide better support for young people who are struggling to maintain a healthy weight and help to shape services to support these young people.

3. Why have I been invited to take part?

You are receiving this because your child is between the ages of 13-17 and struggles with their weight.

4. Do I have to take part?

No. It is up to you to decide whether or not to take part. You can withdraw from the study, without giving a reason and without negative consequences, by advising me of this decision within 2 weeks of your interview

5. What will happen to me if I take part in the research?

If you choose to take part in the study we will schedule a time to do an interview with you. The interview will take approximately 30 minutes. Before the interview starts I will ask again if you agree to take part in the study, this will be recorded as oral consent, or a "spoken agreement" to take part. I will also ask for your consent to audio record our interview so I can have an accurate record of our conversation. You will be emailed a copy of these consent forms for your records.

During the interview I will ask questions about your child's weight, any weight loss attempts, and feelings towards trying to lose weight. We may also touch on body image, self-esteem and any other topics around weight and weight loss. The interview will be audio recorded however it will not be shared with anyone outside the research team. You can ask to stop the interview at any time without giving reason and you do not need to answer any questions if you don't want to.

We will also ask you to share details about post-code, gender and ethnicity. Again, these will not be shared with anyone outside the research team.

6. What are the possible disadvantages and risks in taking part?

The interview may touch on sensitive topics such as weight and self-esteem. You will not be required to reveal anything you are uncomfortable sharing and no identifiable information will be shared with anyone outside the research team.

7. Are there any benefits in taking part?

While there are no immediate benefits for those people participating in the project, it is hoped that this research will lead to more support for young people who are overweight or trying to lose weight.

8. Expenses and payments

You will receive a £20 Amazon voucher for taking part in this study.

9. What information will be collected and why is the collection of this information relevant for achieving the research objectives?

For the purposes of this study we will be collecting the following data from you:

- Name, child's age, gender, ethnicity, post code
- Audio recordings of the interviews

The information you provide during the study is the **research data**. Any research data from which you can be identified (name, contact details, age, audio recordings) is known as **personal data**.

Personal data (including consent forms) will be stored on a secure drive of an encrypted computer accessible only to the research team for up to 3 years.

Other research data will be stored for 3 years after publication or public release of the work of the research.

The researcher and research team, including interview transcriber, will have access to the research data.

Whilst it can be difficult to fully anonymise data, the nature of this study means it would be extremely difficult to identify you from the research data. Your name, and any identifiable features including post-code, will be removed from the published data.

10. Will the research be published? Could I be identified from any publications or other research outputs?

The findings from the research will be written up in a thesis and may be written up in an academic publication. You will not be identifiable in any of the written outputs.

I would like your permission to use direct quotations *but without identifying you* in any research outputs.

A copy of my thesis/ dissertation will be deposited both in print and online in the [Oxford University Research Archive](#) where it will be publicly available to facilitate its use in future research.

11. Data Protection

The University of Oxford is the data controller with respect to your personal data, and as such will determine how your personal data is used in the study. The University will process your personal data for the purpose of the research outlined above. Research is a task that is performed in the public interest. Further information about your rights with respect to your personal data is available from <https://compliance.admin.ox.ac.uk/individual-rights>.

12. Who is funding the research?

This research is jointly funded by the National Institute of Health Research and the Oxford-Wolfson-Marriott NDPCHS Graduate Scholarship.

13. Who has reviewed this study?

This study has received ethics approval from a subcommittee of the University of Oxford Central University Research Ethics Committee. (Ethics reference: R77048/RE002).

14. Who do I contact if I have a concern about the research or I wish to complain?

If you have a concern about any aspect of this study, please contact Melissa Little at Melissa.Little@phc.ox.ac.uk or Paul Aveyard at paul.aveyard@phc.ox.ac.uk and we will do our best to answer your query. We will acknowledge your concern within 10 working days and give you an indication of how it will be dealt with. If you remain unhappy or wish to make a formal complaint, please contact the Chair of the Research Ethics Committee at the University of Oxford who will seek to resolve the matter as soon as possible:

The Chair, Medical Sciences Interdivisional Research Ethics Committee;
Email: ethics@medsci.ox.ac.uk; Address: Research Services, University of Oxford, Wellington Square, Oxford OX1 2JD

15. Further Information and Contact Details

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

Melissa Little
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk

Nuffield Department of Primary Care Health Sciences, University of
Oxford Radcliffe Observatory Quarter, Woodstock Road, Oxford,
OX2 6GG



Principal Investigator:
Melissa Little, DPhil Student
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk

Parental and Adolescent views towards Weight Management in Adolescents

INFORMATION SHEET FOR YOUNG PEOPLE

Ethics Approval Reference: R77048/RE001

I am inviting you to join in a research study. My name is Melissa Little and I work at the University of Oxford in the Department of Primary Care in the Faculty of Medicine.

Before you decide if you would like to join in, it's important to understand what the study is about, why we're doing it and what it would involve for you. Please read and think about this leaflet carefully. Please feel free to talk to your family, friends, or the researchers about it if you want.

If anything isn't clear or you have more questions you can give us a call and we can discuss it with you.

Why are we doing this research?

We want to find out how young people feel towards weight, health and support for both. We are hoping that this research will help us to better help young people to feel supported when managing their weight and health.

Why have I been invited to take part?

We are inviting you to take part because you are a young person, aged between 13 and 17 years. We are inviting many young people from all over England to take part.

Do I have to take part?

No - It is up to you. We will ask you if you agree to take part when we speak before the interview. We will give you a copy of this information sheet to keep. You are free to stop taking part at any time during the research without giving a reason, by telling Melissa that you don't want to take part. You don't have to give a reason and no one will be annoyed with you. It is YOUR choice.

If you decide to stop, we will not use the information we have already collected from you.

What will happen to me if I take part?

If you agree to take part in the research you will be asked to complete 1 online interview with a Melissa which will last approximately 20-30 minutes. During this interview we will ask you questions about your health including how you maintain your health and what support you think would help. We may also touch on body image, self-esteem, fad diets and other weight and health related issues that affect young people. The interview will be recorded however it will not be shared with anyone outside the research team – not even your parents or teachers.

We will also ask you to share details about age, post-code, gender and ethnicity. Again, these will not be shared with anyone outside the research team.

You will receive a gift voucher as a thank you for taking part in the study.

What happens to the results of the study?

The information you provide during the study is the **research data**. Any research data from which you can be identified (name, age audio recordings) is known as **personal data**. **Personal data** will be stored on a secure drive of an encrypted computer accessible only to the research team and deleted immediately when it is no longer needed.

Other research data will be stored for 3 years after publication or public release of the work of the research.

The research will be written up as part of Melissa's work and possibly published in a scientific journal. However, your name will not be on anything and nobody will know it was you taking part.

What are the advantages / disadvantages of taking part?

We are hoping that your input to this study will help us support young people in the future to better manage their health and feel good about themselves and their bodies. There are no intended risks to taking part in the study.

Will anyone else know I'm doing this?

We will keep your information private. This means we will only tell those who have a need or right to know, such as the research team. We will only share information that has your name and address removed.

Who has reviewed the study?

Before any research involving people can start, it has to be checked by a Research Ethics Committee to make sure that it is OK for the research to go ahead. This study has been approved by the University of Oxford Central University Research Ethics Committee.

What if there is a problem or something goes wrong?

Please tell us if you are worried about any part of this study, by contacting the researcher at Melissa.little@phc.ox.ac.uk. If you are still unhappy or wish to make a complaint, you can contact the chair of the Research Ethics Committee at the University of Oxford: Chair, **Medical Sciences Inter-Divisional Research**

Ethics Committee; Email: ethics@medsci.ox.ac.uk; Address: Research Services, University of Oxford,
Wellington Square, Oxford OX1 2JD

Thank you for reading this – please ask any questions if you need to.

Appendix 4.3: Interview Guides

Interview Guide

1. Interviews with parents of young people above a healthy weight

Hello. First, I would like to thank you for taking the time to participate in our study. As a reminder, our discussion will last between 30-60 minutes. If at any point you would like to stop the conversation or feel like you need a break please do let me know. You can stop this interview at anytime without giving a reason and nobody will be upset.

The purpose of this interview is to understand how you feel about your child's weight and their attempts to manage it. Your answers will help us to devise ways to better support young people and their families to achieve a healthy weight.

Although I will ask you a number of questions today, there are no right or wrong answers. The information you share during this interview will be transcribed and will be confidential and anonymous, this means I will not share what you tell me with anyone and nobody will be able to know it was you who said these things. If it is ok I am going to start recording now. ([start recording](#))

Before we start, I'd like to check that you are happy to take part.

[Go through "Oral Consent Script - Parent"](#)

Great, now we are able to start the interview. I am going to ask you some questions about your child's weight and how that makes you feel. Remember you do not need to answer any questions if you don't want to or you don't feel comfortable. If at any point you need a break, or want to stop the interview that is absolutely fine. Also, if there is anything I have not asked but you think I would like to know please feel free to discuss. This is a very informal chat and there are no right or wrong answers.

I. Feelings towards your child's weight

Do you feel that your child is overweight?

- a. *Probe 1: Are you aware of how excess weight in children is measured or any clinical risks associated with being overweight?*
- b. *Probe 2: Do you think your child would like to lose weight?*
- c. *Probe 3: Have you or your child ever experienced any stigma or bullying based on their weight? How does this make you feel?*
- d. *Probe 4: Do you feel like your own weight effects your feelings about your child's weight?*
- e. *Probe 5: Do you think there has been anyone or anything has as strong influence on your child's weight?*

II. The effect of weight on the parent/child relationship

What effect, if any, do you feel that your child's weight has on your relationship with your child?

- a. *Probe 1: Have you ever discussed your child's weight with them? If so, how did that conversation go?*
- b. *Probe 2: Do you feel like your child would be receptive to you discussing weight with them?*
- c. *Probe 3: What, if any, effect do you feel these discussions would have on your child's self-esteem or mental health? How do you think you could minimise these effects?*
- d. *Probe 4: Do you feel like it is your role as a parent to support your child with their weight? If not, whose role is it?*

III. Your child's weight management journey

Can you tell me about anything you as a family, or your child, has done, that you are aware of, to control their weight?

- a. *Probe 1: What are your feelings on any weight control behaviours your child may have engaged in?*
- b. *Probe 2: Do you feel there is anything that you, or anyone else, could do to better support your child with their weight?*
- c. *Probe 3: To what extent do you feel your child's school or environment effect their ability to lose weight?*

IV. Summary

We've now reached the end of the interview. Is there anything that was not mentioned in today's discussion that you would like to add or would you like to further discuss any issue that was previously raised?

Once again, thanks so much for sharing your time and thoughts with us today.

2. Interviews with young people above a healthy weight

Hello. First, I would like to thank you for taking the time to participate in our study. As a reminder, our discussion will last between 30-60 minutes. If at any point you would like to stop the conversation or feel like you need a break please do let me know. You are allowed to stop this interview at anytime without giving a reason and nobody will be upset.

The purpose of this interview is to understand how you feel about your weight and any attempts you have made to manage your weight. Your answers will help us to devise ways to better support young people to achieve a healthy weight.

Although I will ask you a number of questions today, there are no right or wrong answers. The information you share during this interview will be transcribed and will be confidential and de-identified, this means I will not share what you tell me with anyone and nobody will be able to know it was you who said these things. If it is ok I am going to start recording now. ([start recording](#))

I have previously obtained consent from your parent to conduct this interview however I would now like to ensure that you are also ok to take part.

[Go through "Oral Assent Script - Child"](#)

Great, now we are able to start the interview. I am going to ask you some questions about your weight and how that makes you feel. Remember you do not need to answer any questions if you don't want to or you don't feel comfortable. If at any point you need a break, or want to stop the interview that is absolutely fine. Also, if there is anything I have not asked but you think I would like to know please feel free to discuss. As I said, this is a very informal chat and there are no right or wrong answers.

I. Feelings towards your weight

Do you feel that you are overweight?

- a. *Probe 1: What is your reasons for labelling yourself overweight?*
- b. *Probe 2: Do you want to lose weight? If so, what are your main motivations for losing weight?*
- c. *Probe 3: Have you ever experienced any stigma or bullying based on your weight? If so, how did that make you feel?*
- d. *Probe 4: What or who do you feel is responsible for your excess weight?*

II. The effect of weight on the parent/child relationship

What effect, if any, do you feel that your weight has on your relationship with your parent(s)?

- e. *Probe 1: Have you ever discussed your weight with your parent(s)? If so, how do those conversations go? How would they/do they make you feel?*
- f. *Probe 2: Would you be ok if your parents brought up your weight in conversation?*

- g. Probe 3: What, if any, effect do you feel these conversations (would) have on your self-esteem or mental health? How could these effects be minimised?*
- h. Probe 4: Do you feel that your parents should play a role in your weight loss?*

III. Your weight management journey

Can you tell me about anything you, or your family, have done, to help control your weight?

- d. Probe 1: Do you feel supported in any weight control behaviours you may take part in?*
- e. Probe 2: Do you feel there is anything that your parents could do to better support you with your weight?*
- f. Probe 3: To what extent do you feel your school, environment or peers effect your ability to lose weight?*

IV. Summary

We've now reached the end of the interview. Is there anything that was not mentioned in today's discussion that you would like to add or would you like to further discuss any issue that was previously raised?

Once again, thanks so much for sharing your time and thoughts with us today.

Appendix 5.1: Full weight concern and weight support prevalence data from OxWell School Survey broken down by demographic

	To what extent do you worry about your body shape or weight? (%)						Would you like help to lose weight? (%)				
	not at all worried	Not very worried	Quite worried	Worried	Extremely worried	No Response	Yes	No	I Don't know	Prefer not to say	No response
Total	30	27	15	13	14	2	30	46	14	5	4
Boy	43	30	12	7	6	2	23	60	11	3	4
Girl	19	24	18	18	19	2	36	37	17	7	3
Gender Diverse	10	15	11	19	43	2	47	29	13	10	2
Gender non- disclosing	27	20	12	11	25	4	32	35	16	12	5
Year 7	33	28	15	11	11	2	27	44	17	7	5
Year 8	31	27	15	12	13	2	29	45	16	6	4
Year 9	29	27	14	14	14	2	31	46	15	5	3
Year 10	30	26	15	12	15	2	32	46	13	4	3
Year 11	28	25	15	14	16	2	33	50	12	4	2
Year 12	29	26	14	15	15	2	34	47	12	4	3
Year 13	29	25	16	13	15	1	31	50	12	4	4
White	28	27	15	14	15	2	30	47	15	5	3
Mixed/Multiple	30	25	17	13	14	2	33	45	13	5	4

Asian	29	29	16	13	11	1	31	45	15	6	3
Black	39	24	13	10	12	2	35	46	11	4	3
Arab	40	25	13	9	10	4	29	46	14	5	6
Other	31	25	15	13	14	2	32	45	13	6	3
No Response	34	26	13	11	13	3	29	46	14	6	5
1 (least Deprived)	31	27	15	13	13	1	30	47	14	5	3
2	24	20	15	10	28	3	42	29	13	8	8
3 (most deprived)	26	6	7	3	56	3	36	33	10	10	10

Appendix 6.1: Feasibility Study Patient Information Sheets



NUFFIELD DEPARTMENT OF
PRIMARY CARE
HEALTH SCIENCES

Primary Care
Clinical Trials Unit

Principal Investigator: Melissa Little
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk

PARTICIPANT INFORMATION SHEET (Competent Youth)

REthiNking Approaches to Excess Weight in Adolescents (RENEWAL): a randomised feasibility trial to assess a digital Intervention for managing excess weight in adolescents with overweight and obesity

We'd like to invite you to take part in our research study. Before you decide, it is important that you understand why the research is being done and what it would involve. Please take time to read this information, and discuss it with others if you wish. If there is anything that is not clear, or if you would like more information, please ask us.

What is the purpose of the study?

Currently 1 in 3 young people in the UK are overweight or obese. Carrying excess weight can lead to issues with both physical health, such as high blood pressure or diabetes, and mental health, such as anxiety or depression. It is therefore important that we try to support young people who would like to lose weight. Unfortunately current approaches to weight loss in this age group are often not successful and are not designed around the needs and lifestyles of young people. Second Nature is an app which is used in adults to support them to make changes to their eating, exercise and sleeping habits, the intention of this study is to compare this app with routine care in adolescents to see how successful young people are in using the app and whether it may be a helpful tool in supporting them to maintain a healthy weight.

Why have I been invited?

You have been invited to take part in this study because you are between the ages of 16-17 and are considered to be above a healthy weight range. We are hoping to involve thirty teenagers, all above a healthy weight, to take part in this study.

Do I have to take part?

No, it is up to you whether you take part or not. You are free to withdraw from the study at any time without giving a reason. A decision to withdraw from the study will not affect the usual care you receive from your GP or practice nurse or other healthcare professional.

What will happen if I decide to take part?

If you choose to take part in the study a research assistant will schedule a time to do a baseline assessment with you over MS Teams. Before the assessment starts we will ask you detailed questions on whether or not you agree to take part in the study, and ask you to consent to each question; this will be recorded as oral consent, or a "spoken agreement" to take part. Once consent

Competent Youth Participant Information Sheet
REthiNking Approaches to Excess Weight in Adolescents (RENEWAL):
a randomised feasibility trial to assess a digital Intervention for managing
excess weight in adolescents with overweight and obesity
Melissa Little

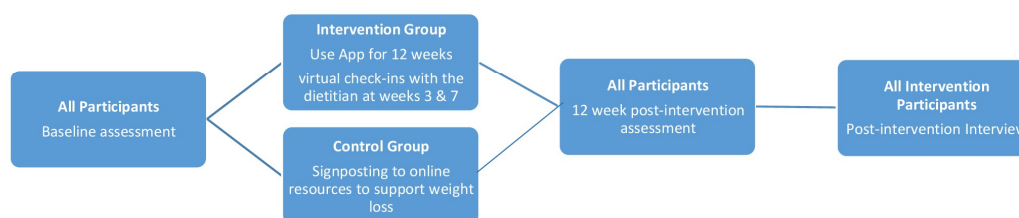
V1.2/18.05.2023
IRAS Project number: 316058
REC Reference number: 22/NS/0143

has been obtained we will email you a copy of the completed form for your records. After this we will conduct the baseline assessment which will involve answering some questions about eating habits and self-esteem. We will also take some demographic details such as age, gender, ethnicity and post-code. If we do not have a current height and weight from your referring health professional (ie) the Dr or Nurse who referred you, we may ask you to weigh yourself on home scales and send a photo to us for verification. If you don't have any scales at home we can send you some in the post.

Once the baseline assessment is complete you will be assigned to either the intervention or a control group. This will be done through randomisation which means participants will be allocated a group at random by a computer programme. If you are in the control group, you will receive a 30-60min 1:1 with a dietitian. You and the dietitian will work together to suggest healthy behaviour changes and set some SMART goals for you to work on. The control group will not be contacted again until the end of the 12 week trial period. If you are assigned to the intervention group you will be given access to an app called Second Nature that supports healthy eating and physical activity. You will be asked to use this app for the next 12 weeks in a way that works around your lifestyle. You will also be asked to do a virtual check-in with a dietitian at week three and week seven where you will discuss how you are getting on and any questions you may have.

After 12 weeks participants in both the control group and the intervention group will be asked to complete another assessment with the research team. This assessment will be done in person at a mutually acceptable venue so that measurements can be taken. Participants will be asked answer all the same questions as the baseline assessment and weight and height will be recorded. If an in-person assessment is not possible, participants will again be asked to weigh themselves on home scales and send us a photo for verification.

Once the intervention is complete participants in the intervention group will be asked to take part in a 30 minute telephone interview to discuss what they thought of the app and their experiences using it. The discussion will be audio recorded and direct anonymous quotes may be used in study outputs.



What should I consider?

In order to take part in this study you must be aged 13-17 years and have a BMI z-score above the 91st centile as diagnosed by a health and care professional. Participants must also speak English, must not have any significant learning delays and must not be undergoing treatment for any current

Competent Youth Participant Information Sheet
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 REC Reference number: 22/NS/0143

mental health issues. They must also have access to a device where they can download and regularly use the app.

If you agree to take part in the study, you would need to:

- Follow your allocated treatment to the best of your ability
- Complete questionnaires, which we will provide
- Attend 4 appointments with the dietitian or research team; 3 virtual and 1 in person

Are there any possible disadvantages or risks from taking part?

This is a low risk public health intervention therefore the disadvantages and risks to taking part are minimal. However all participants will be monitored for signs of disordered eating and mental wellbeing and will be referred back to local health services should the need arise. It is also possible that a safeguarding issue may arise during the course of the study. The lead researcher has completed both NHS and University safeguarding training and understands the protocol that must be followed in such a situation.

What are the possible benefits of taking part?

Whilst participants may lose weight and increase their health by taking part in this study, we do not know what the outcome will be which is why we are conducting this research. Participants will learn more about healthy eating, exercise and sleep for weight loss and be able to discuss their needs with a dietitian. It is hoped that the results of this study will support young people to better manage their weight in the future.

Will my General Practitioner/family doctor (GP) be informed of my participation?

No, your GP will not be informed of your participation in the research study as participation in the study should not have any effect on your clinical care.

Will my taking part in the study be kept confidential?

Data collected throughout the study, will be recorded onto secure electronic Case Report Forms (CRFs), incorporated in the study's electronic database. The database will be password-protected and kept on a secure University server with access limited to members of the research team. Second Nature, a third party who are designing and delivering the digital intervention, will also have access to identifiable data and have been vetted to ensure they follow all university data protection procedures.

Information which can identify you will not be recorded on any study data collection forms (paper or electronic), apart from the main study consent form and the contact details sheet. Instead, any information recorded about you in this study will be assigned a study code (pseudonymised). A code sheet linking your study code with your personal data, will be kept separately and securely in the archiving facilities of the University of Oxford's Nuffield Department of Primary Care Health Sciences.

Competent Youth Participant Information Sheet
REthiNking Approaches to Excess Weight in AdoLescents (RENEWAL):
a randomised feasibility trial to assess a digital Intervention for managing
excess weight in adolescents with overweight and obesity
Melissa Little

V1.2/18.05.2023
IRAS Project number: 316058
REC Reference number: 22/NS/0143

Qualitative interview sessions will be audio-recorded, encrypted and kept securely in a password-protected University server. They will be transferred in an encrypted manner to a University of Oxford approved transcriber (a third party) following secure University approved procedures. The transcriptions will be pseudonymised using the participant ID number. Following transcription, the original audio-recording will be deleted immediately. The pseudonymised transcriptions will be securely stored in a password-protected University server.

Following study completion, the study's electronic database, CRFs and other study documentation will remain pseudonymised with the participant study code for 5 years after the end of the study. Responsible members of the University of Oxford and the relevant NHS Trusts may be given access to data for monitoring and/or audit of the study to ensure that the research is complying with applicable regulations.

Will I be reimbursed for taking part?

This study's procedures have been designed in a way that most assessments and intervention sessions are done virtually or by phone. This is to minimise your burden with regards to the time and effort needed to attend visits. You will only be asked to attend two face-to-face visits, one when you are recruited to the study, and one post-intervention to record your weight and height.

We will offer to all participants a £20 gift card at the 12-week post-intervention appointment to compensate for the time and inconvenience of attending. Participants taking part in the qualitative interviews will be offered an extra £20 gift card for their time.

What will happen to my data?

United Kingdom data protection regulation requires that we state the legal basis for processing information about you. In the case of research, this is 'a task in the public interest.' The University of Oxford, based in the United Kingdom, is the sponsor for this study, and the data controller and is responsible for looking after your information and using it properly.

We will be using information from you in order to undertake this study and will use the minimum personally-identifiable information possible. We will keep identifiable information, name and contact details, for a year after the end of the study. This excludes any research documents with personal information, such as consent forms, which will be held securely at the University of Oxford's Nuffield Department of Primary Care Health Sciences, for 5 years after the end of the study and will then be destroyed. Please see the section on confidentiality for more information on exactly how your data will be used and stored.

Qualitative interviews, until transcription, will be encrypted and kept in a password protected University server. They will be transferred in an encrypted manner to a university approved transcriber following secure University approved procedures. The transcriptions will be pseudonymised using the participant study code. Following transcription, the original audio-recording will be deleted immediately. The de-identified transcriptions will be securely stored in a password-protected University server for 3 years before being deleted.

Competent Youth Participant Information Sheet
REthiNking Approaches to Excess Weight in AdoLescents (RENEWAL):
a randomised feasibility trial to assess a digital Intervention for managing
excess weight in adolescents with overweight and obesity
Melissa Little

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If you agree to your details being held to be contacted regarding future research, we will retain a copy of your consent form until such time as your details are removed from our database but will keep the consent form and your details separate.

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What will happen if I don't want to carry on with the study?

Participation is voluntary and you can withdraw at any time; your current or future care will not be affected by this decision. We will give you the opportunity to tell us the reason for withdrawing if you would like to. If you request to withdraw from the study, we will use the data that we have collected from you up to that point unless you ask us not to in which case we will permanently delete your data.

What will happen to the results of this study?

We are hoping that the findings from this research will be written up in an academic publication and potentially presented at academic conferences. You will not be identifiable in any of the research outputs. Some of the research being undertaken will also contribute to the fulfilment of a doctoral thesis a copy of which will be deposited both in print and online in the [Oxford University Research Archive](#) where it will be publicly available to facilitate its use in future research; a URL address will be available to you should you wish to access it. All participants will be sent a summary of the study findings via email or post. Information about publication arrangements will be included in the participant information sheet as well as the summary sheet of the results. Participants will have been made aware since the recruitment stage that we intend to keep their contact information for up to a year after the end of the study, and this will enable us to send them the results.

What will happen at the end of the study?

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What if we find something unexpected?

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Members of the public helped to shape the ideas for this research, and to decide the questions that we are trying to answer. In designing this study we have taken into account patient opinions on the schedule of appointments that you will be asked to attend and the patient information sheets.

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Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect participants' interests. This study has been reviewed and given favourable opinion by North of Scotland Research Ethics Committee 2.

Participation in future research:

We would like to keep your contact details on file for participation in future research. Your contact details would be held separately from this study on a secure, password protected computer in the Nuffield Department of Primary Care. All contact will come from your research team in the first instance and agreeing to be contacted does not oblige you to take part in future research; you can be removed from this register at any time you wish.

Further information and contact details:

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

Melissa Little
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk

Thank you for taking the time to read this information sheet

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REthiNking Approaches to Excess Weight in AdoLescents (RENEWAL): a randomised feasibility trial to assess a digital Intervention for managing excess weight in adolescents with overweight and obesity

INFORMATION SHEET FOR YOUNG PEOPLE

My name is Melissa Little and I work at the University of Oxford in the Department of Primary Care in the Faculty of Medicine. I am inviting you to join in a research study.

Before you decide if you would like to join in, it's important to understand what the study is about, why we're doing it and what it would involve for you. Please read and think about this leaflet carefully. Please feel free to talk to your family, friends, or the researchers about it if you want.
If anything isn't clear or you have more questions you can ask your parent/guardian to give us a call and we can discuss it with you and your parent/guardian.

Why are we doing this research?

We know that a lot of young people are over a healthy weight. We also know that many of those young people want to lose weight but don't know how or don't have the support they need. We want to find out if a weight loss app is a good way to support young people who are overweight to lose weight.

Why have I been invited to take part?

We are inviting you to take part because you are a young person, aged between 13 and 15 years who is above a healthy weight. We are inviting 30 young people to take part.

Do I have to take part?

No - It is up to you. We have already spoken to your parent and received consent, or permission, for you to take part however it is very important that we get your agreement, or assent, as well. We will ask you if you agree to take part before you sign up to the study. We will also give you a copy of this information sheet to keep. You are free to stop taking part at any time during the research without giving a reason, by telling Melissa or your parent/guardian that you don't want to take part. You don't have to give a reason and no one will be annoyed with you. It is YOUR choice.

What will happen to me if I take part?

If you choose to take part in the study we will schedule a time to chat virtually and have you answer some question about your eating habits and self-esteem. We will also record your weight and height, age, gender, ethnicity and post-code. If we do not have a current height and weight from your referring health professional (ie) Dr or Nurse who referred you, we may ask you to weigh yourself on home scales and send a photo to us for verification. If you don't have any scales at home we can send you some in the post. This chat will take about 20-30 minutes.

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Once we have answered all the questions we will assign you to either an intervention group or a control group. This will be done randomly. If you are in the control group you will briefly chat about your weight with a Dietitian and you will be signposted to websites to help you manage your weight. You will not be contacted again for 12 weeks.

If you are assigned to the intervention group you will be given access to an app called Second Nature that supports healthy eating and physical activity. You will be asked to use this app for the next 12 weeks. The app will help you to track your eating, sleeping and physical activity. It also has lots of interesting articles and videos around how to maintain a healthy weight and a chat function where you can ask questions to a dietitian and chat to other young people on the programme. You will also be asked to do a virtual check-in with a dietitian at week three and week seven.

After 12 weeks you will be contacted again for a chat and you will be asked all the same questions you were asked at the beginning. Participants in the intervention group will then be asked to do a separate 30 minute interview to tell us what they liked or didn't like about using the app. If you are invited and decide to take part in this conversation you will be audio recorded.

You will be given a £20 voucher for answering the questions at the end of the study and another £20 voucher if you decide to do the interview.

What will happen to data collected about me?

We will keep information about you for 5 years after the study has finished. Most of this will have a code instead of your name. Some research documents with personal information, such as consent and assent forms, will be held securely at the University of Oxford for 5 years after the end of the study. All data from the study will be anonymised at the end of the research. This means there will no longer be anything that links the data back to you. The law says you are in charge of your own information and get to decide how it is used. To make sure the research we do is right, sometimes when your information is used in research you don't get to decide everything. To learn more about what you can decide about your information (or 'your rights'), you can visit here: <https://compliance.web.ox.ac.uk/individual-rights>

What happens to the results of the study?

The information you provide during the study is the **research data**. All your data will be stored on a secure drive of an encrypted computer accessible only to the research team; nobody else will have access to this data. What we learn from this study will be written up as part of a doctoral thesis and possibly published in a scientific journal. However, your name will not be on anything and nobody will know it was you taking part.

What are the advantages / disadvantages of taking part?

The questions may touch on sensitive topics such as weight and self-esteem. You will not be required to reveal anything you are uncomfortable sharing and no identifiable information will be shared with

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anyone outside the research team. We are hoping that your input to this study will help us support children in the future to better manage their weight and feel good about themselves and their bodies.

Will anyone else know I'm doing this?

We will keep your information private. This means we will only tell those who have a need or right to know, such as the research team and your parent/guardian. We will only share information that has your name and address removed.

Who has reviewed the study?

Before any research involving people can start, it has to be checked by a Research Ethics Committee to make sure that it is OK for the research to go ahead. This study has been approved by the North of Scotland Research Ethics Committee 2.

What if there is a problem or something goes wrong?

Please tell us if you are worried about any part of this study, by contacting the researcher at Melissa.little@phc.ox.ac.uk. You may also talk to your parent/guardian who will let the researcher know.

Thank you for reading this – please ask any questions if you need to.

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Melissa Little	



PARENT/GUARDIAN INFORMATION SHEET

REthiNking Approaches to Excess Weight in Adolescents (RENEWAL): a randomised feasibility trial to assess a digital Intervention for managing excess weight in adolescents with overweight and obesity

We'd like to invite your child to take part in our research study. Before you decide, it is important that you understand why the research is being done and what it would involve. Please take time to read this information, and discuss it with others if you wish. If there is anything that is not clear, or if you would like more information, please ask us.

What is the purpose of the study?

Currently 1 in 3 young people in the UK are overweight or obese. Carrying excess weight can lead to issues with both physical health, such as high blood pressure or diabetes, and mental health, such as anxiety or depression. It is therefore important that we try to support young people who would like to lose weight. Unfortunately current approaches to weight loss in this age group are often not successful and are not designed around the needs and lifestyles of young people. Second Nature is an app which is used in adults to support them to make changes to their eating, exercise and sleeping habits, the intention of this study is to compare this app with routine care in adolescents to see how successful young people are in using the app and whether it may be a helpful tool in supporting them to maintain a healthy weight.

Why has my child been invited?

Your child has been invited to take part in this study because they are between the ages of 13-16 and are considered to be above a healthy weight range. We are hoping to involve thirty teenagers, all above a healthy weight, to take part in this study.

Do they have to take part?

No, it is up to you and your child whether to take part or not. Your child is free to withdraw from the study at any time without giving a reason. A decision to withdraw from the study will not affect the usual care your child receives from their GP or practice nurse or other healthcare professional.

What will happen to my child if they decide to take part?

If your child chooses to take part in the study a research assistant will schedule a time to do a baseline assessment with your child over MS Teams. Before the assessment starts we will ask detailed questions on whether or not you agree for your child to take part in the study, and ask you to consent to each question; this will be recorded as oral consent, or a "spoken agreement" to take

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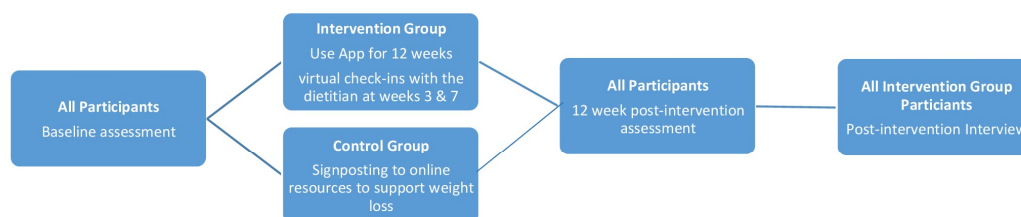
part. As your child is under the age of 16 you will need to consent for them to take part however they will also need to provide oral “assent” which means that they also have to agree to take part in the study. Your child will not be approached until we have received oral consent from the parent or guardian. Once consent and assent have been obtained we will email you a copy of the completed forms for your records. After this we will conduct the baseline assessment which will involve answering some questions about eating habits and self-esteem. We will also take some demographic details such as age, gender, ethnicity and post-code. If we do not have a current height and weight from your child’s referring health professional (ie) the Dr or nurse who referred you, we may ask you to weigh your child on home scales and send a photo to us for verification. If you don’t have any scales at home we can send you some in the most.

Once the baseline assessment is complete your child will be assigned to either the intervention or a control group. This will be done through randomisation which means participants will be allocated a group at random by a computer programme. If your child is in the control group, your child will receive a 30-60min 1:1 with a dietitian. Your child and dietitian will work together to suggest healthy behaviour changes and set some SMART goals for your child to work on. The control group will not be contacted again until the end of the 12 week trial period.

If your child is assigned to the intervention group they will be given access to an app called Second Nature that supports healthy eating and physical activity. They will be asked to use this app for the next 12 weeks in a way that works around their lifestyle. They will also be asked to do a virtual check-in with a dietitian at week three and week seven where they will discuss how they are getting on and any questions they may have.

After 12 weeks participants in both the control group and the intervention group will be asked to complete another assessment with the research team. This assessment will be done in person at a mutually acceptable venue so that measurements can be taken. Participants will be asked answer all the same questions as the baseline assessment and weight and height will be recorded. If an in-person assessment is not possible, participants will again be asked to weigh themselves on home scales and send us a photo for verification.

Once the intervention is complete participants in the intervention group will be asked to take part in a 30 minute telephone interview to discuss what they thought of the app and their experiences using it. The discussion will be audio recorded and direct anonymous quotes may be used in study outputs. .



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What should I consider?

In order to take part in this study your child must be aged 13-16 years and have a BMI z-score above the 91st centile as diagnosed by a health and care professional. Participants must also speak English, must not have any significant learning delays and must not be undergoing treatment for any current mental health issues. They must also have access to a device where they can download and regularly use the app.

If you agree for your child to take part in the study, your child would need to:

- Follow their allocated treatment to the best of their ability
- Complete questionnaires, which we will provide
- Attend 4 appointments with the dietitian or research team; 3 virtual and 1 in person

Are there any possible disadvantages or risks from taking part?

This is a low risk public health intervention therefore the disadvantages and risks to taking part are minimal. However all participants will be monitored for signs of disordered eating and mental wellbeing and will be referred back to local health services should the need arise. It is also possible that a safeguarding issue may arise during the course of the study. The lead researcher has completed both NHS and University safeguarding training and understands the protocol that must be followed in such a situation.

What are the possible benefits of taking part?

Whilst participants may lose weight and increase their health by taking part in this study, we do not know what the outcome will be which is why we are conducting this research. Participants will learn more about healthy eating, exercise and sleep for weight loss and be able to discuss their needs with a dietitian. It is hoped that the results of this study will support young people to better manage their weight in the future.

Will my child's General Practitioner/family doctor (GP) be informed of their participation?

No, your child's GP will not be informed of their participation in the research study as participation in the study should not have any effect on your clinical care.

Will my child's taking part in the study be kept confidential?

Data collected throughout the study, will be recorded onto secure electronic Case Report Forms (CRFs), incorporated in the study's electronic database. The database will be password-protected and kept on a secure University server with access limited to members of the research team. Second Nature, a third party who are designing and delivering the digital intervention, will also have access to identifiable data and have been vetted to ensure they follow all university data protection procedures.

Information which can identify your child will not be recorded on any study data collection forms (paper or electronic), apart from the main study consent form and the contact details sheet. Instead, a code sheet linking your child's study code with their personal data, will be kept separately and

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securely in the archiving facilities of the University of Oxford's Nuffield Department of Primary Care Health Sciences.

Qualitative interview sessions will be audio-recorded, encrypted and kept securely in a password-protected University server. They will be transferred in an encrypted manner to a University of Oxford approved transcriber (a third party) following secure University approved procedures. The transcriptions will be pseudonymised using the participant ID number. Following transcription, the original audio-recording will be deleted immediately. The pseudonymised transcriptions will be securely stored in a password-protected University server.

Following study completion, the study's electronic database, CRFs and other study documentation will remain pseudonymised with the participant study code for 5 years after the end of the study. Responsible members of the University of Oxford and the relevant NHS Trusts may be given access to data for monitoring and/or audit of the study to ensure that the research is complying with applicable regulations.

Will my child be reimbursed for taking part?

This study's procedures have been designed in a way that most assessments and intervention sessions are done virtually or by phone. This is to minimise your child's burden with regards to the time and effort needed to attend visits. Your child will only be asked to attend two face-to-face visits, one when they are recruited to the study, and one post-intervention to record their weight and height.

We will offer to all participants a £20 gift card at the 12-week post-intervention appointment to compensate for the time and inconvenience of attending. Participants taking part in the qualitative interviews will be offered an extra £20 gift card for their time.

What will happen to my child's data?

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We will be using information from your child in order to undertake this study and will use the minimum personally-identifiable information possible. We will keep identifiable information, name and contact details, for a year after the end of the study. This excludes any research documents with personal information, such as consent forms, which will be held securely at the University of Oxford's Nuffield Department of Primary Care Health Sciences, for 5 years after the end of the study and will then be destroyed. Please see the section on confidentiality for more information on exactly how your child's data will be used and stored. .

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Additionally, NHS indemnity operates in respect of the clinical treatment which is provided.

If you wish to complain about any aspect of the way in which your child have been approached or treated, or how your child's information is handled during the course of this study, you should contact Melissa Little on 01865 219385 or Melissa.little@phc.ox.ac.uk or you may contact the University of Oxford Research Governance, Ethics and Assurance (RGEA) office on 01865 616480, or the head of RGEA, email rgea.complaints@admin.ox.ac.uk.

How have patients and the public been involved in this study?

Members of the public helped to shape the ideas for this research, and to decide the questions that we are trying to answer. In designing this study we have taken into account patient opinions on the schedule of appointments that you and your child will be asked to attend and the patient information sheets.

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Participation in future research:

We would like to keep your child's contact details on file for participation in future research. Your child's contact details would be held separately from this study on a secure, password protected computer in the Nuffield Department of Primary Care. All contact will come from your research team in the first instance and agreeing to be contacted does not oblige your child to take part in future research; your child can be removed from this register at any time you wish.

Further information and contact details:

If you would like to discuss the research with someone beforehand (or if you have questions afterwards), please contact:

Melissa Little
Nuffield Department of Primary Care Health Sciences
Oxford University telephone number: 01865 289315
Oxford University e-mail: Melissa.Little@phc.ox.ac.uk

Thank you for taking the time to read this information sheet

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Appendix 6.2: Feasibility Study Questionnaires

PATIENT QUESTIONNAIRES

ROSENBERG SELF-ESTEEM SCALE

Below is a list of statements dealing with your general feelings about yourself. There are 4 possible answers for each of the 10 questions, from 'strongly agree' to 'strongly disagree'. Tick the box to indicate how strongly you agree or disagree with each statement.

		Strongly Agree	Agree	Disagree	Strongly Disagree
1	On the whole, I am satisfied with myself				
2	At times, I think I am no good at all				
3	I feel that I have a number of good qualities				
4	I am able to do things as well as most other people				
5	I feel I do not have much to be proud of				
6	I certainly feel useless at times				
7	I feel that I am a person of worth, at least on an equal plane with others				
8	I wish I could have more respect for myself				
9	All in all, I am inclined to feel that I am a failure				
10	I take a positive attitude towards myself				

1

Patient Questionnaires
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ADOLESCENT FOOD HABITS CHECKLIST
Please tick the box that is right for you most of the time

1) If I am having lunch away from home, I often choose a low-fat option. ☐ True ☐ False ☐ I never have lunch away from home.	2) I usually avoid eating fried foods. ☐ True ☐ False
3) I usually eat a dessert or pudding if there is one available. ☐ True ☐ False	4) I make sure I eat at least one serving of fruit a day. ☐ True ☐ False
5) I try to keep my overall fat intake down. ☐ True ☐ False	6) If I am buying crisps, I often choose a low-fat brand. ☐ True ☐ False ☐ I never buy crisps
7) I avoid eating lots of sausages and burgers. ☐ True ☐ False ☐ I never eat sausages or burgers	8) I often buy pastries or cakes ☐ True ☐ False
9) I try to keep my overall sugar intake down. ☐ True ☐ False	10) I make sure I eat at least one serving of vegetables or salad a day. ☐ True ☐ False
11) If I am having a dessert at home, I try to have something low in fat. ☐ True ☐ False ☐ I don't eat desserts	12) I rarely eat takeaway meals ☐ True ☐ False

2

13) I try to ensure that I eat plenty of fruit and vegetables. ☐ True ☐ False	14) I often eat sweet snacks between meals. ☐ True ☐ False
15) I usually eat at least one serving of vegetables (excluding potatoes) or salad with my evening meal. ☐ True ☐ False	16) When I am buying a soft drink, I usually choose a diet drink. ☐ True ☐ False
17) When I put butter or margarine on bread, I usually spread it on thinly. ☐ True ☐ False ☐ I never have butter or margarine on bread	18) If I have a packed lunch, I usually include some chocolate and/or biscuits. ☐ True ☐ False ☐ I never have a packed lunch
19) When I have a snack between meals, I often choose fruit. ☐ True ☐ False ☐ I never eat snacks between meals	20) If I am having a dessert or pudding in a restaurant, I usually choose the healthiest one. ☐ True ☐ False ☐ I never have desserts in restaurants
21) I often have cream on desserts ☐ True ☐ False ☐ I don't eat desserts	22) I eat at least 3 servings of fruit most days ☐ True ☐ False
23) I generally try to have a healthy diet. ☐ True ☐ False	That's it! Thank you for your time in completing this questionnaire.

3

Adult Eating Behaviour Questionnaire

Please read each statement and tick the box most appropriate to you

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
I love food	☐	☐	☐	☐	☐
I often decide that I don't like a food, before tasting it	☐	☐	☐	☐	☐
I enjoy eating	☐	☐	☐	☐	☐
I look forward to mealtimes	☐	☐	☐	☐	☐
I eat more when I'm annoyed	☐	☐	☐	☐	☐
I often notice my stomach rumbling	☐	☐	☐	☐	☐
I refuse new foods at first	☐	☐	☐	☐	☐
I eat more when I'm worried	☐	☐	☐	☐	☐
If I miss a meal I get irritable	☐	☐	☐	☐	☐
I eat more when I'm upset	☐	☐	☐	☐	☐
I often leave food on my plate at the end of a meal	☐	☐	☐	☐	☐
I enjoy tasting new foods	☐	☐	☐	☐	☐
I often feel hungry when I am with someone who is eating	☐	☐	☐	☐	☐
I often finish my meals quickly	☐	☐	☐	☐	☐
I eat less when I'm worried	☐	☐	☐	☐	☐
I eat more when I'm anxious	☐	☐	☐	☐	☐
Given the choice, I would eat most of the time	☐	☐	☐	☐	☐

Patient Questionnaires

REthiNking Approaches to Excess Weight in AdoLescents (RENEWAL):
a randomised feasibility trial to assess a digital Intervention for managing
excess weight in adolescents with overweight and obesity
Chief Investigator: Melissa Little

V1.0/26.10.2022

IRAS Project number: 316058
REC Reference number: 22/NS/0143

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
I eat less when I'm angry	☐	☐	☐	☐	☐
I am interested in tasting new food I haven't tasted before	☐	☐	☐	☐	☐
I eat less when I'm upset	☐	☐	☐	☐	☐
I eat more when I'm angry	☐	☐	☐	☐	☐
I am always thinking about food	☐	☐	☐	☐	☐
I often get full before my meal is finished	☐	☐	☐	☐	☐
I enjoy a wide variety of foods	☐	☐	☐	☐	☐
I am often last at finishing a meal	☐	☐	☐	☐	☐
I eat more and more slowly during the course of a meal	☐	☐	☐	☐	☐
I eat less when I'm annoyed	☐	☐	☐	☐	☐
I often feel so hungry that I have to eat something right away	☐	☐	☐	☐	☐
I eat slowly	☐	☐	☐	☐	☐
I cannot eat a meal if I have had a snack just before	☐	☐	☐	☐	☐
I get full up easily	☐	☐	☐	☐	☐
I often feel hungry	☐	☐	☐	☐	☐
When I see or smell food that I like, it makes me want to eat	☐	☐	☐	☐	☐
If my meals are delayed I get light-headed	☐	☐	☐	☐	☐
I eat less when I'm anxious	☐	☐	☐	☐	☐

5

Patient Questionnaires REthiNking Approaches to Excess Weight in AdoLescents (RENEWAL): a randomised feasibility trial to assess a digital Intervention for managing excess weight in adolescents with overweight and obesity Chief Investigator: Melissa Little	V1.0/26.10.2022 IRAS Project number: 316058 REC Reference number: 22/NS/0143
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Appendix 6.3: Feasibility Study Referral Guide

Nuffield Department of Primary Care Health Sciences, University of Oxford

Principal Investigator:
Melissa Little
Nuffield Department of Primary Care Health Sciences
07557 360624
Melissa.Little@phc.ox.ac.uk



The RENEWAL Study: An Overview for referring HCPs

Study Aim:

This is a feasibility study which aims to evaluate the Second Nature (www.secondnature.io) weight management app for use in adolescents aged 13-17 who are above a healthy weight.

Who is involved?

The study is being conducted by the Primary Care Department at the University of Oxford (<https://bit.ly/3HXHwtL>) and is funded by the National Institute of Health Research Applied Research Collaboration (<https://bit.ly/3JryGok>).

How can you be involved?

We are looking to recruit young people aged 13-17 who have a BMI z-score above the 91st centile to take part in the study.

Inclusion Criteria	Exclusion Criteria
• Aged 13-17 • BMI z-score $\geq 91^{\text{st}}$ centile • Has access to a tablet or smartphone	• Any of the following that may interfere with adherence to the intervention: • Mental illness or significant mental health problems • Learning delay • Physical illness

What will the study involve for young people?

Young people will be streamlined to either the intervention or the control groups (2:1). The control group will receive a 1:1 with a Dietitian where they will review current behaviours, set smart goals and be signposted to further resource.

The intervention group will gain access to the Second Nature app and be encouraged to use it for 12 weeks with Dietitian check-ins at weeks 3 and 7. Both groups will undergo pre and post-intervention assessment and post-intervention progress, or lack thereof, will be reported to the referring HCP.

How to refer?

If you have a patient you think may be suitable for the programme, they can be referred over the phone at 01865 289449. Or, by filling the details in on this secure form <https://forms.office.com/e/wan0iMGgUa>. The patient must be informed that you are referring them on to the study and agree to being referred. Once a patient is referred we will contact them to provide more information on the study and, if they are still interested in taking part, obtain informed consent and register them to the trial.

For more information on the RENEWAL study please contact Melissa.Little@phc.ox.ac.uk

Appendix 6.4: Feasibility Study Newsletter



NUFFIELD DEPARTMENT OF
PRIMARY CARE
HEALTH SCIENCES
Medical Sciences Division

The RENEWAL Study

Recruitment Update Letter

September 2023

The RENEWAL Study is trialling whether or not an app can promote weight loss in overweight and obese teenagers. The study is being run by the University of Oxford and is funded by the National Institute of Health Research.



To date, 16 young people have been referred to the RENEWAL Trial



-  **5** completed a 12 week app-based weight loss intervention
-  **4** Completed a 1:1 with a Dietitian representing usual care
-  **3** Are waiting to join the next cohort of the intervention
-  **4** Were deemed ineligible or unable to take part

We are hoping to start our second cohort in early October. Referrals can be made by emailing Melissa.Little@phc.ox.ac.uk

Referrals must be aged 13-17 and overweight for their age.

PI: Melissa Little, Nuffield Department of Primary care, University of Oxford,
Email: Melissa.Little@phc.ox.ac.uk Tel: 01865 289449

Seasons Greetings from the **RENEWAL** Study!

REthinking Novel Approaches to
Excess Weight in AdoLescents



Dear RENEWAL Study Stakeholders,

As the holiday season is upon us, I want to take a moment to thank you for all your support of the RENEWAL Study over the last year. 2023 has been a year filled with achievements, growth, and shared successes, and we're excited to wrap it up on a festive note.

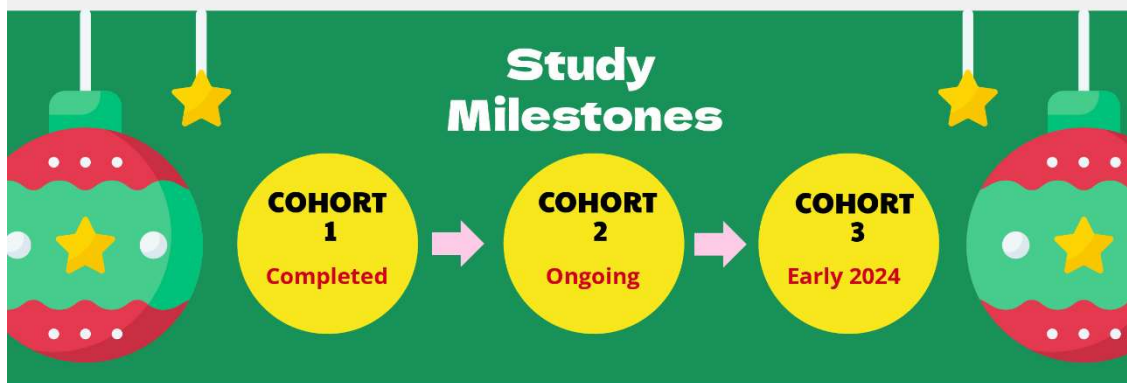


Referrer of the Year



We are thrilled to announce that Natasha, Christine, Becky and the rest of the team at **Here for Health** are our referrer's of the year. Between them they have referred many participants to the RENEWAL study. Thank you for contributing to the success of this study!

Study Milestones



Thank you again for all your support for this study. We are still recruiting so please do get in touch (melissa.little@phc.ox.ac.uk) if you have patients you would like to refer.

Warm regards,
Melissa Little | PI, RENEWAL Study



Appendix 6.5: Feasibility Study Engagement Data

UserID	Learn Count	Track Count	Support Count	Food Diary Count	Weigh In Count	Total
1000	2	5	0	0	1	8
	0	2	0	1	0	3
	0	7	2	0	1	10
	0	1	0	0	0	1
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	2	1	0	0	3
	0	1	1	0	0	2
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	2	0	0	0	2
	2	20	4	1	2	29
1003	4	12	1	0	0	17
	77	14	1	0	0	92
	5	8	3	0	0	16
	0	4	1	0	0	5
	0	1	1	0	0	2
	0	2	0	0	0	2
	0	3	0	0	0	3
	0	3	2	0	0	5
	0	2	0	0	0	2
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	86	49	9	0	0	144
1008	0	0	0	0	0	0
	0	12	1	0	0	13
	0	5	2	0	0	7
	0	1	0	0	0	1
	0	0	0	0	0	0
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	0	0	0	0	0	0
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	0	0	0	0	0	0

[illegible]

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	0	3	1	0	0	4
	0	13	2	0	0	15
10017	0	0	0	3	0	3
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	6	11	1	0	0	18
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	0	5	2	0	1	8
	2	6	0	0	0	8
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	0	1	0	0	0	1
	0	0	0	0	0	0
	0	4	2	0	0	6
	0	1	0	0	0	1
	0	2	0	0	0	2
	0	6	0	0	0	6
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10022	0	1	0	0	0	1
	1	4	1	0	0	6
	0	1	0	0	0	1
	0	0	0	0	0	0
	0	1	0	0	0	1
	0	1	0	0	0	1
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
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	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	1	8	1	0	0	10
10023	0	3	3	0	0	6
	0	3	0	0	0	3
	0	1	0	0	0	1
	2	5	1	0	0	8
	0	2	1	0	0	3
	0	1	0	0	0	1
	0	4	2	0	0	6
	0	2	0	0	0	2

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	0	0	0	0	0	0
	0	1	0	0	1	2
	0	1	0	0	0	1
	2	23	7	0	1	33
OVERALL TOTAL	114	171	32	4	4	650