Do appetitive traits impact success in tier three weight management services?

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The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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4 Abstract

Introduction: Appetitive traits are stable, genetically determined predispositions towards food, which can be influenced by people's environments. Understanding the appetitive traits of people engaged in weight management, and whether these traits are associated with weight loss success, could contribute to the development of tailored interventions.

Method: A mixed-methods design explored: 1) the appetitive traits of adults accessing a Specialist Weight Management Tier Three Service; 2) whether appetitive traits were related to a weight loss of 5% of total body weight or more; and 3) participants' own experiences of their appetitive traits during weight management. Participants (*n*=74) completed the Adult Eating Behaviour Questionnaire (AEBQ) and provided demographic and weight history data. Baseline and follow-up weight measurements were obtained from medical records. Logistic regression analyses explored relationships between five AEBQ appetitive traits and whether 5% weight loss was achieved. Interviews were conducted with 22 participants and data was analysed using reflexive thematic analysis.

Results: Participants who were more satiety responsive, and those with a slower speed of eating were more likely to achieve 5% weight loss or more (OR 3.15; 95% CI [1.38,7.17] and OR 1.93; 95% CI [1.02,3.68] respectively). Interview data suggested that slower speed of eating may reflect the successful management of other appetitive traits. Interviewees shared their experiences of enjoyment of food, emotional eating, and stigma as important in their weight management attempts.

Discussion: This is the first study to explore the appetitive traits of people accessing a U.K. weight management service. Results must be interpreted cautiously given the small sample, but findings suggest greater responsiveness to satiety and a slower speed of eating may be determinants of weight loss success. Future research should further explore the influence of appetitive traits on weight management, including the potential for tailored interventions to support individuals with more avid appetites.

5 Introduction

5.1 Overweight and obesity in England

Overweight and obesity refer to an excess of body fat, otherwise known as adiposity. While adiposity can be measured in a variety of ways, obesity is commonly classified according to body mass index (BMI) which is calculated by dividing a person's weight by their height squared. A BMI of 30kg/m2 or more is considered obese and BMIs of 40 or more are classified as morbidly obese (WHO, 2015). Obesity is a chronic, complex, relapsing and multifactorial condition which relates to biological, environmental, psychosocial, and cultural factors (Stubbs & Lavin, 2013; Williamson et al., 2020).

The United Kingdom (U.K.) is currently facing an obesity epidemic as 63% of the population are estimated to live with overweight or obesity (NHS Digital, 2019). The prevalence of people living with obesity has consistently increased, rising from 15% in 1993 to 28% in 2019 (Baker, 2021). Some of the highest levels of obesity within England are in Yorkshire and the Humber, where 40% of people are estimated to live with overweight or obesity, and 25% with obesity or morbid obesity (NHS Digital, 2019, 2022b).

Across England there is a higher prevalence of people living with overweight and obesity among some ethnic minority groups. For example, 22% of Chinese women live with overweight and obesity, whereas 74% of Pakistani women live with overweight or obesity (NHS Digital, 2022a). Comparatively, Chinese men are least likely to live with overweight or obesity, and the proportions of men living with overweight and obesity from other ethnic groups do not significantly vary (NHS Digital, 2022a). Furthermore, a 2021 survey suggested that deprived areas have higher numbers of people living with overweight and obesity than affluent areas; 34% of people in deprived areas live with obesity compared to 20% in the least deprived areas (NHS Digital, 2022b). However, there are challenges around accurately estimating the national prevalence of obesity. The Health Survey for England (HSE) monitors the prevalence of obesity nationally through annual surveys but only people living in private households are eligible. Therefore, survey results are not representative of people from varied socioeconomic status (SES) backgrounds, who are more likely to live in areas of deprivation and who may live in house shares, sheltered or council provided housing (NHS Digital, 2018).

The use of BMI to estimate obesity prevalence within health services, and research generally, has been criticised as BMI is an inaccurate measure of excess weight as it does not account for fat-free mass, such as bones, muscle and bodily tissue (Humphreys, 2010). Significant differences in body fat distribution patterns have been found in relation to gender,

and among racial and ethnic groups (Mongraw-Chaffin et al., 2015); BMI cannot account for these variations in storage or differences in individual risk for conditions such as diabetes that are independent of weight (NICE, 2014; Yaghootkar et al., 2020). For example, Hispanic and African-American women tend to have a greater amount of fat storage around their thighs, hips, and buttocks, whereas Asian women generally have greater storage around their abdomen (Wang et al., 2015). Although differences in abdominal fat storage have been reported based on ethnicity, these differences seem to be consistently less in men compared to women (Lim et al., 2019; Mongraw-Chaffin et al., 2015). Other measures such as waist-circumference and waist-hip ratio are commonly used anthropometric indices, and over the last decade more accurate indices have been devised which have stronger relationships with body fat distribution, total fat mass, and health risks such as heart failure. For example, relative fat mass, body-roundness index, and body-shape index (Suthahar et al., 2022). However, as the data needed to calculate these indices is not commonly gathered in healthcare, their utility in understanding prevalence at a national level is limited.

5.2 Impacts of overweight and obesity

5.2.1 Physical health impacts of overweight and obesity

Adults living with overweight or obesity are at a higher risk of developing conditions such as diabetes, heart disease, stroke (Branca et al., 2007) cancer and respiratory disease (Guh et al., 2009; Nyberg et al., 2018). During the COVID-19 pandemic people with a higher BMI were found to be at a greater risk of testing positive for COVID, being hospitalised, requiring advanced treatments such as ventilation, and serious illness or death (NHS England, 2021; Public Health England, 2020). People living with obesity have a reduced life expectancy (Abdelaal et al., 2017) but the risk of most physical health complications can be decreased through weight loss (Szabo & Kierczuk, 2018).

5.2.2 Mental health impacts of overweight and obesity

Systematic reviews suggest that there is a bidirectional relationship between mental health and weight (Gariepy et al., 2010; Luppino et al., 2010), with some reporting positive associations between the two for women, and negative associations for men (Allison et al., 2009; Chen et al., 2009; Luppino et al., 2010; Markowitz et al., 2008). Within England, the prevalence of overweight and obesity is higher among those living with severe mental health difficulties (Public Health England, 2018a), and the prevalence of disordered eating patterns may also be higher among people with severe mental illness (Davison et al., 2014; Yum et al., 2009).

People living with severe mental health difficulties have a reduced life expectancy (Firth et al., 2019) and are more likely to experience risk factors associated with overweight and obesity, such as limited access to healthy foods, lower income, and physical health conditions which impact on mobility (Centre for Mental Health, 2020). While SES is negatively associated with weight and mental health, the relationship between mental health and obesity may be independent of SES, as research has found that people with high SES living with obesity have an increased risk of depression (Chen et al., 2009; Markowitz et al., 2008).

It has been proposed that the relationship between weight and mental health is moderated by factors such as experience of stigma, and psychological factors such as a self-perceptions, self-esteem and negative thoughts (Gatineau & Dent, 2011; Markowitz et al., 2008; Napolitano & Foster, 2008). Jackson et al. (2015) examined whether the negative association between living with obesity and poor psychological well-being could be accounted for by weight discrimination. The researchers utilised a sample of 5056 adults over the age of 50 in England, as part of the English Longitudinal Study of Ageing. The results suggested that experiencing weight discrimination explained a considerable proportion of the association between psychological well-being and living with obesity; the large sample indicates that this finding is generalisable.

Robinson et al. (2020) proposed a model which accounts for why living with overweight and obesity may lead to lower mental health, based on social psychology models and weight stigma research. They proposed that when people perceive themselves to be overweight, concerns about social rejection arise, and weight stigma is internalised; this contributes to psychological distress and unhelpful health behaviours, leading to increases in body weight. Experiences of stigma in relation to weight can lead people to experience shame, lower self-esteem, shame and subsequently to have an increased risk of mental health difficulties in comparison so those living with a 'normal' weight (Carr & Friedman, 2005; Davison et al., 2008; Miller & Downey, 1999; O'Dea, 2006). For example, people may manage distressing experiences with food and potentially overeat (Gatineau & Dent, 2011).

5.2.3 Financial impacts of overweight and obesity

The consequences of obesity are estimated to cost the National Health Service (NHS) £5.1 billion annually (Public Health England, 2017; Szabo & Kierczuk, 2018) and if the prevalence rates continue to increase, costs could be close to £50 billion by 2050 (Department of Health, 2011). Effective weight-management services to support people with weight loss could decrease long-term NHS expenditure, as it has been projected that if each person living with overweight and obesity lost 2.5kg this would lead to a potential saving of £105 million

over five years (Department of Health and Social Care, 2020). Reducing the prevalence of obesity is supported through Public Health England (2017), and is included within the NHS long term plan (2019) and the Leeds Health and Wellbeing Strategy until 2030 (Feroze, 2023; Leeds Health and Wellbeing Board, 2016).

5.3 Causes and moderators of overweight and obesity

To successfully manage weight, an understanding of the factors which contribute to overweight, and obesity is needed. From a biological perspective, obesity results from an energy imbalance, with calorie consumption being greater than energy expenditure (Campbell, 2016; Poti & Popkin, 2011; Qasim et al., 2018). Energy imbalances can occur for numerous reasons, including as a consequence of physical health conditions (Yumuk et al., 2015). Obesity has been proposed to reflect the interaction between genetic, metabolic, cultural and environmental factors (Campbell, 2016).

Swinburn et al. (1999) defined the 'obesogenic environment' as the net impact of systemic influences, such as physical surroundings, opportunities or conditions which may promote obesity. The numbers of people living with obesity is notably higher in countries with higher and upper-middle incomes which have high levels of urbanisation and industrialism (Fuentes Pacheco et al., 2018). At the local level, some research studies have reported links between food environment and body weight. For example, research has found that living in deprived food areas increases food behaviours which contribute to obesity (Cobb et al., 2015; Giskes et al., 2011; Jebb et al., 2007), particularly for people who have limited mobility and must source food in their immediate environments (Fuentes Pacheco et al., 2018). Deprived areas may have limited access to healthy foods, with fewer supermarkets or shops selling fruits and vegetables, and a higher number of fast-food restaurants. Cobb et al. (2015) conducted a systematic review to explore the relationship between local food environment and numbers of people living with obesity, and reported that most reviewed studies reported no relationship, but that many of the studies were of low quality. A second systematic review is underway by Fuentes Pacheco et al. (2018), which may further contribute to the understanding of local food environments and body weight. The understanding of the relationship between food environments and body weight may also be improved by formal measures which assess and facilitate the comparison of obesogenic environments (Kaczynski et al., 2020); in turn, preventative interventions for obesity may be improved. Eskandari et al. (2022) conducted a mixed-methods systematic review and meta-analysis to explore the influence of both food environment and food insecurity upon obesity prevalence in children and adults. Their meta-analysis indicated that there was a statistically significant positive relationship between food

insecurity and obesity. This finding was supported by their qualitative synthesis, which highlighted that the most affordable foods were low in nutrients and high in energy.

Research utilising large-scale samples of twins under the age of 18 to explore the influence of genetics on BMI have consistently reported heritability rates of 60-90% (Silventoinen et al., 2010; Wardle et al., 2008). Nan et al. (2012) conducted a meta-analysis to explore the genetic influence on body weight across the lifespan and reported that genetic influence remained high (60-80%) but that the influence of the environment increased with age, beginning at 14% in preadolescence and rising to 40% in late adulthood. Locke et al. (2015) identified 97 common genetic variants associated with BMI in their meta-analysis, and it has been proposed that other causes of obesity such as physical health syndromes, hypothalamic conditions, endocrine conditions, effects relating to medications, mental health difficulties and lifestyle should also be considered (van der Valk et al., 2019). In addition to biological factors, it may also be helpful to consider environmental factors and individuals' experiences of stigma in relation to weight management. For example, the systemic oppression people face while living with obesity, or how this interacts with other oppressions relating to factors such as race, sexuality or social status (Prohaska & Gailey, 2019).

Therefore, although research has considered the biological causes and moderators of overweight and obesity, a theoretical understanding which directly connects genetics and environment, and how they impact one another, can be helpful.

5.4 Appetitive traits

Appetitive traits are genetically determined predispositions towards food, which can be influenced by people's environments and are believed to be stable over time (Carnell et al., 2013; Llewellyn et al., 2012). Prospective studies in children have demonstrated that appetitive traits are associated with weight gain over time (Kininmonth et al., 2021) and longitudinal research suggests that there is a bidirectional relationship between weight and expression of appetitive traits (Bjørklund et al., 2022; Costa et al., 2021; Derks et al., 2018; Parkinson et al., 2010; Steinsbekk et al., 2017; Steinsbekk & Wichstrøm, 2015; van Jaarsveld et al., 2011).

Appetitive traits can be divided into 'food approach' and 'food avoidance' traits. Appetitive traits can be observed through the way we behave around, and react to, food on a day-to-day basis. For example, how quickly we feel full and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness. People with high food approach traits may have a higher interest in food and a more fervent appetite, leading them to consume more food and subsequently have a higher body weight. Food avoidance traits contribute to a smaller appetite, lower interest in food and therefore potentially less

consumption and lower body weight. Here, 'appetite' refers to the combination of individual appetitive traits, and their net impact upon food approach and food avoidance.

The behavioural susceptibility theory of obesity suggests that inherited appetitive traits predict an individual's likelihood of weight gain when in an obesogenic environment (Carnell et al., 2008; Carnell & Wardle, 2008). The model proposes that inherited individual differences in appetite can account for why in environments that offer an abundance of palatable foods, some people overeat, while others do not (Llewellyn & Wardle, 2015; Llewellyn & Fildes, 2017). People who may be genetically predisposed to have a lower interest in food, or smaller appetite, may be protected when living in obesogenic environments. Traits such as Food Responsiveness (FR), characterised by wanting to eat in response to food stimuli (e.g. smell, sight) and Satiety Responsiveness (SR; how quickly people feel full) are thought to influence people's susceptibility to living with overweight and obesity (Llewellyn & Wardle, 2015).

5.4.1 Measuring appetitive traits

5.4.1.1 Measurement tools

Many studies assessing the impact of appetitive traits on weight have used valid and reliable questionnaires. Psychometric measures of appetite enable the collection of large quantities of data at relatively low cost (Carnell & Wardle, 2007). The most used measures in adults are the now 18-item 'Three-Factor Eating Questionnaire' (TFEQ; Stunkard & Messick, 1985) and the 33-item 'Dutch Eating Behaviour Questionnaire' (DEBQ; Van Strien et al., 1986). The DEBQ assesses three types of eating behaviours in adults (Emotional Eating, Restraint and External Eating) while the original TFEQ assesses three other types (Cognitive Restraint, Disinhibition and Hunger). In children, the most used measure is the 35 item Child Eating Behaviour Questionnaire (CEBQ; Wardle et al., 2001). The CEBQ captures the highest number of appetitive traits including food approach traits (Food Responsiveness, Emotional Over-Eating and Enjoyment of Food, Desire to Drink) and food avoidance traits (Satiety Responsiveness, Emotional Under-Eating, Food Fussiness and Slowness in Eating) in paediatric populations (Wardle et al., 2001). Unlike the CEBQ, the DEBQ does not differentiate between over- and under-eating. The TFEQ Disinhibition scale is a combination of emotional eating and food responsiveness, meaning it provides a limited understanding of the two concepts individually.

5.4.1.2 Adult Eating Behaviour Questionnaire

The CEBQ was adapted for use as a self-report questionnaire with adults by Hunot et al. (2016); the Adult Eating Behaviour Questionnaire (AEBQ). Food approach traits, as measured by the CEBQ, positively correlate with weight in children (Croker et al., 2011; Santos et al.,

2011; Sleddens et al., 2008). In contrast, children with high food avoidance traits are less likely to overeat and have lower body weights (Fuemmeler et al., 2013; Spence et al., 2011; Webber et al., 2009).

The AEBQ is a validated measure which assesses four food approach traits (Food Responsiveness [FR], Emotional Over-Eating [EOE], Enjoyment of Food [EF] and Hunger [H]) and four food avoidance traits (Satiety Responsiveness [SR], Emotional Under-Eating [EUE], Food Fussiness [FF] and Slowness in Eating [SE]). The AEBQ is currently the most comprehensive self-report measure for assessing appetitive traits (Hunot et al., 2016).

Research has consistently found associations between appetitive traits, captured by the AEBQ in adults or the CEBQ in children, and body weight (French et al., 2012; French et al., 2014; Hunot et al., 2016; Spence et al., 2011; Temple et al., 2008; Viana et al., 2008; Webber et al., 2009). High FR scores are associated with increased consumption, whereas high SR scores are associated with less consumption (Boutelle et al., 2020). While some AEBQ validation studies suggest that a seven-factor model (with H excluded) provides the best fit (Cohen et al., 2021; Hunot-Alexander et al., 2021; Hunot-Alexander et al., 2019), other studies suggest that an eight-factor model is the best (He, Sun, et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019).

The use of a seven-factor model over an eight-factor model of the AEBQ is based in debate around the inclusion of hunger as it may be classified as a state, rather than a trait (Harrold et al., 2012; Hunot et al., 2016). H is intended to capture the physical sensation of hunger in the body (Hunot et al., 2016) but perception of hunger can differ between individuals (He, Sun, et al., 2021; Wardle, 1987; Zickgraf & Rigby, 2019) and be dependent on external factors such as recency of eating at the time of completing the measure (Blundell et al., 2009; Gibbons et al., 2019; Harrold et al., 2012). Therefore, a greater number of AEBQ validation studies, utilising diverse and gender-balanced samples, may contribute to reaching consensus on whether H should be included (Cohen et al., 2021; Hunot-Alexander et al., 2019). Validation studies of the AEBQ in adolescents support a seven-factor structure (Hunot-Alexander et al., 2021) but as this thesis is focused on adults, these studies will not be further discussed.

5.4.2 Appetitive traits and weight

Research which has measured the genetic risk of living with obesity suggests that appetite mediates the relationship between genetic variants and body weight (Jacob et al., 2018; Llewellyn et al., 2014). Llewellyn et al. (2012) conducted an analysis of twins and found there to be a genetic aetiology between appetitive traits and weight. In adults, genetic variations associated with BMI have been associated with overeating appetitive traits such as Emotional

Eating and Food Responsiveness (De Lauzon-Guillain et al., 2017; Jacob et al., 2018; Konttinen et al., 2015). Positive correlations have been reported between food approach traits and weight, and negative correlations between food avoidance traits and weight, for both adults and children (Hunot et al., 2016; Mallan et al., 2013; Santos et al., 2011; Sleddens et al., 2008; Viana et al., 2008; Webber et al., 2009).

Individual differences in appetitive traits have been observed from the age of three months (Llewellyn & Fildes, 2017; Llewellyn et al., 2010). Measurements of appetitive traits before the age of five suggest that trait expression can fluctuate (Costa et al., 2022; Parkinson et al., 2010), but measurements of traits after the age of five have been found to be both stable and statistically related to later BMI (Ashcroft et al., 2008; Jansen et al., 2023; Parkinson et al., 2010). Specifically, high scores for EOE and Desire to Drink were associated with higher BMI, whereas individuals who scored highly for SR had a lower BMI years later. Therefore, considering appetitive traits across the life span may inform preventative interventions, and secondary interventions focused on reducing body weight.

The possibility of measuring appetitive traits early in life to inform the provision of individual preventative interventions is supported by results of the Gemini Birth Cohort study, which studied the data of over 1000 families with children aged 16 to 21 months old. The results suggested that higher Food Responsiveness was associated with more frequent meals, but not bigger meals (Syrad et al., 2016). However, Satiety Responsiveness was inversely related to the size of the meals eaten (Syrad et al., 2016), and in a separate study has been linked with both satiety after the meal and amount eaten (Hinton et al., 2018).

Studies focused on appetitive traits in children have found associations between appetitive traits and, food preferences (Fildes et al., 2015; Russell & Worsley, 2016), eating patterns (Carnell et al., 2016), nutritional status (Putri et al., 2022), sleep (Miller et al., 2019; Ramírez-Contreras et al., 2022) and cardiometabolic health (Warkentin et al., 2020; Zhang et al., 2022). Warkentin et al. (2020) note that the associations they found between appetite and children's cardiometabolic health were highly dependent on the body weight (adiposity) of the child. It is important to acknowledge that these results may be influenced by participants' SES, as this dictates children's environment, access to food, expression of appetitive traits and body weight (Delahunt et al., 2022).

Kininmonth et al. (2021) were the first to systematically review and conduct a meta-analysis of studies considering the associations between appetitive traits, as assessed using the CEBQ (Wardle et al., 2001), and child adiposity. Kininmonth et al. (2021) found that many studies reported positive associations between child adiposity and the appetitive traits Food

Responsiveness, Enjoyment of Food and Emotional Over-Eating. More widely, they found that traits assessed by the Baby Eating Behaviour Questionnaire (BEBQ) and CEBQ showed consistent cross-sectional relationships with adiposity.

5.4.2.1 The AEBQ and appetitive traits literature

The AEBQ is the most comprehensive appetitive trait measure currently available and therefore has the potential to further understanding of appetitive traits, their impacts, and how these relate to weight management. A literature review was conducted to explore the relationship between appetitive traits (as measured by the AEBQ) and weight in adults. The inclusion criteria included peer-reviewed papers, published at any time, with participants aged 18 and over, utilising the eight-factor AEBQ and the relationship between appetitive traits and weight for all eight traits. There is a paucity of literature exploring the relationship between AEBQ scores and weight in populations living with overweight or obesity, so all adult studies were included. Studies in children or adolescents were excluded.

Searches were conducted across the databases EMBASE, PsycINFO and Ovid MEDLINE on 31st October 2022. Search terms included: “adult eating behaviour questionnaire”, “adult eating behavio?r questionnaire” and “AEBQ”. The search returned 206 results; duplications and studies which met the search exclusion criteria were removed, resulting in nine studies. Table ***5.1*** provides a summary of each study.

Table 5.1

Studies measuring associations between AEBQ appetitive traits and body weight

Author (year)	Trait and association with BMI								Factors adjusted for in analysis	Sample	Location	Mean BMI ($kg/m^{2)}$	Mean age (years)	Weight measurement
	Food approach traits				Food avoidance traits									
	H	FR	EOE	EF	SR	EUE	FF	SE						
Cohen et al. (2021)*	0	+S	+M	+VS	-VS	-M	0	-S	Age Sex	Female (404), male (134)	Canada	24.90 ± 5.10	39.50 ± 16.40	Self-reported
He, Sun, et al. (2021)	0	0	0	0	-S	0	-VS	-S	Gender	Zhejiang (506) Liaoning (562)	China	21.11 ± 3.10	20.15 20.02	Self-reported
Hunot et al. (2016)	0	+VS	+S	+VS	-S	-S	0	-S	None	Female (372), male (336)	U.K.	26.10 ± 5.81	39.00 ± 17.00	Self-reported
Hunot-Alexander et al. (2021)	0	0	+L	0	-L	0	0	-L	BMI Age Sex	Female (621), male (402)	Mexico	26.10 ± 5.00	36.80 ± 12.80	Research team
Jacob et al. (2021)*	0	+VS	+VS	0	0	-VS	0	-VS	Age Sex	University affiliated. Female (147), male (50)	Canada	26.20 ± 4.70	36.10 ± 14.50	Research team
Mallan et al. (2017)	-S	0	+S	0	-S	0	-S	-S	Gender Age Sample	University students (408) and social media (590)	Australia	24.90 ± 5.60	24.32 ± 8.32	Self-reported
Murakami et al. (2022)	0	+VS	+S	+VS	-S	-VS	0	-S	None	Female (1163), male (1068)	Japan	22.90 ± 3.50	50.20 ± 17.30	Self-reported
Shamsalinia et al. (2022)	+ S	+M	+S	+S	-S	-S	-S	0	None	Females (378) and males (322) living with epilepsy	Iran	Unknown	38.87 ± 11.67	Unclear
Zickgraf and Rigby (2019)	0	0	+S	0	0	-S	0	0	None	Female (337), male (70)	America	48.27 ± 8.70	43.04 ± 12.22	Research team

Note. All but the studies marked * used continuous BMI (kg/m2) to measure body weight. 0 = no statistically significant relationship, + = positive statistically significant relationship, - = negative statistically significant relationship. Pearson's correlation coefficient was used to define effect sizes (Laerd Statistics, 2018): VS = very small effect size (.<10), S= small effect size (.10), M = moderate effect size (.30), L = large effect size (.50).

The results of the nine studies are summarised here, with the acknowledgement that this is a small number of studies and firm conclusions about relationships between weight and AEBQ-measured appetitive traits are not yet possible. Studies are discussed in relation to the statistical significance of the reported relationships between appetitive traits and weight. It is noteworthy that there is currently a lack of knowledge surrounding the clinical significance of these relationships and further research is needed. Furthermore, the heterogeneity in approaches to the measurement (i.e. self-report versus researcher measured) and reporting of weight (continuous versus weight categories) between different studies, complicates direct comparison of research findings.

As shown in Table ***5.1***, studies generally reported positive relationships between food approach traits and BMI, and negative relationships between food avoidance traits and BMI; in line with the original AEBQ validation study (Hunot et al., 2016). However, the relationships between individual traits and BMI were not consistent, indicating that some traits may be more strongly related to BMI. Most studies reported no statistically significant relationship between BMI and Hunger (7/9 studies), Enjoyment of Food (5/9 studies), or Food Fussiness (6/9 studies).

The strongest reported relationship appeared to be between EOE and weight, as eight of the nine studies reported a statistically significant positive relationship. He, Sun, et al. (2021) reported no relationship between EOE and BMI but their Chinese sample had a lower average age and BMI in comparison to the other studies. Hunot-Alexander et al. (2021) reported a large effect-size in a Mexican sample, and Cohen et al. (2011) reported a medium effect size for the relationships between EOE and BMI in their Canadian sample. Hunot-Alexander et al. (2021) explicitly asked participants whether they were trying to manage their weight and reported significant associations between EOE and BMI for both participants trying to manage weight and those who were not.

A Unites States (U.S.) study conducted in a sample of people at the beginning of a pre-bariatric surgery weight management programme, reported a small positive correlation between EOE and BMI (Zickgraf & Rigby, 2019). Although the U.S. weight management services differ from those of the U.K., this study is the closest available comparison to the tier three weight management service (T3WMS) population. These findings suggest that EOE may contribute to weight, or even potentially weight loss success, in people actively trying to manage their weight.

The second food approach trait to show consistent positive relationships with BMI was FR. Overall, five studies reported statistically significant positive relationships between FR and

BMI; an Iranian study reported a medium effect size (Shamsalinia et al., 2022) and three other studies reported a very small effect size (Hunot et al., 2016; Jacob et al., 2021; Murakami et al., 2022). Jacob et al. (2021) found that their Canadian sample who lived with overweight and obesity had higher FR scores than those with a 'normal' BMI, although this relationship was only present when sex and age were adjusted for. Conversely, Mallan et al. (2017) reported no associations between BMI and FR in their Australian study. Mallan et al. proposed that this may reflect the participants' successful management of weight through self-regulation of food intake, reducing the trait expression. However, as their study did not measure self-regulation of food intake, the explanation is theoretical. It would be beneficial to explore the lived experience of people engaging in weight management, and their perspectives on how traits link to increases in weight, or the impacts of effective management of these.

Seven of the nine studies reported negative relationships between SR and BMI, while the remaining two studies reported no relationship. Of the studies that reported no relationship between SR and BMI, one used categorical measurements of BMI, 'normal' and 'overweight/obese', reducing variance in the data and making it difficult to establish a linear relationship between BMI and SR (Jacob et al., 2021).

Seven of the nine studies reported negative relationships between SE and BMI, the strongest of which was a large effect size (Hunot-Alexander et al., 2021). However, Hunot-Alexander et al. (2021) noted that their large effect was only present for participants who were not actively trying to lose weight. Zickgraf and Rigby (2019) also reported a negative relationship between SE and BMI in their active weight management sample, although this had a small effect size. Two studies found no relationship between SE and BMI, but neither study controlled for demographic variables in their analysis (Shamsalinia et al., 2022; Zickgraf & Rigby, 2019). Shamsalinia et al. (2022) utilised an Iranian sample and were the only researchers to utilise a sample living with epilepsy but did not explain their reasoning for not including the use of epilepsy medications in their analysis. Some epilepsy medications have been associated with weight changes (Hamed, 2015; Milligan, 2021). Had Shamsalinia et al. (2022) utilised a control group or controlled for epilepsy medications, this may have informed the influence of food approach traits in their sample.

Six of the nine studies reported a significant negative relationship between EUE and BMI; one study reported a medium effect size (Cohen et al., 2021) while the others reported only small or very small effects (Hunot et al., 2016; Jacob et al., 2021; Murakami et al., 2022; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019).

It is noteworthy that none of the studies reported average BMIs of less than 21.11; had there been more studies with lower BMIs, different relationships may have been reported. As 63% of the U.K. population are estimated to live with overweight or obesity (NHS Digital, 2019), studies with average BMIs below 25 may be considered low relative to the U.K. population. Some research has suggested that the appetites of people living with overweight and obesity are different to those living with healthy or underweight, as this group have been reported to have higher scores for EOE (Cohen et al., 2021; Jacob et al., 2021) and FR (Cohen et al., 2021), and lower scores for EUE (Cohen et al., 2021; Jacob et al., 2021) and SE (Cohen et al., 2021).

Across all studies, the Mexican validation study by Hunot-Alexander et al. (2021) was the only one to report large effect sizes for relationships between AEBQ-measured traits (EOE and SR) and BMI. However, these large effect sizes were only consistent for participants actively managing weight. While other studies did not separate their analyses according to whether or not participants were actively trying to lose weight, Zickgraf and Rigby (2019) utilised a U.S. bariatric surgery-seeking sample, which implies that participants were trying to lose weight and were motivated to achieve weight loss. It is possible that the expression or awareness of appetitive traits may change when people try to manage their weight; thus, weight management attempts may be a moderating factor of appetitive traits (Johnson & Wardle, 2014; Wardle & Johnson, 2015).

Some studies explored gender differences in the relationship between weight and traits. For example, some studies reported that females had significantly higher scores for EOE (Jacob et al., 2021; Zickgraf & Rigby, 2019), even when age and BMI were controlled for (Jacob et al., 2021). Similarly, females were reported to have higher scores for SR, EUE and SE (Zickgraf & Rigby, 2019). However, it is noteworthy that in each of the two studies, women accounted for a high proportion of the sample; women accounted for 74.62% of the sample in the research by Jacob et al. (2021), and women accounted for 82.80% of the sample in the research by Zickgraf and Rigby (2019). Murakami et al. (2022) noted that in their sample mean consistently lower on all traits compared to women, except for on food fussiness, as men scored as fussier with food but their scores appeared somewhat similar. Other studies have reported no gender differences in responses to the AEBQ (He, Sun, et al., 2021; Hunot-Alexander et al., 2021). It is noteworthy that several studies reviewed here reported having more women than men in their research (see Table ***5.1***), and this therefore may limit the understanding of men's appetitive traits.

Included studies also reported age-related differences in appetitive traits, and it has been suggested previously that traits may vary with age (Ashcroft et al., 2008). Murakami et al. (2022) explored this relationship with respect to age and found that while FR and BMI were significantly related in the whole sample, when analysed by age group the relationship was only significant for participants aged 40-59. While Murakami et al. (2022) reported consistent significant associations between EOE and weight, Cohen et al. (2021) found that participants aged 18–35 years old had significantly higher EOE scores compared to those aged 56 and over, and significantly higher scores for FR, H and EUE than those aged 36–55 years old. However, as both studies included age as a categorical variable in analysis, it may be that a more nuanced relationship between age and appetitive traits may have been found if age was analysed as a continuous variable.

A strength of the literature reviewed here is that the studies were geographically varied, meaning that findings may inform the profiles of appetitive traits in relation to weight within different cultural contexts, different healthcare structures such as nationalised or privatised healthcare. However, it is difficult to account for the heterogeneity of food environments, cultural attitudes, and accessibility to healthcare and weight education across studies. Within Western countries, the study samples were mostly female and identified as White, which may mean that results are not generalisable to the global population (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019).

5.5 Weight management services

The clinical approach to weight management in the U.K. involves four tiers of weight management services: tier one services are preventative primary care; tier two services provide multi-component lifestyle weight management; tier three services provide specialist weight management services; and tier four services provide bariatric surgery. There are national plans to expand NHS weight management services (Department of Health and Social Care, 2020), and while it is unknown how many people living in England may require the support of services to manage weight, globally 42% of people are trying to lose weight (Santos et al., 2017).

NICE (2014) guidelines suggest that people should be referred to T3WMSs: if the underlying causes of their obesity require assessment; if other forms of support are inappropriate or have been ineffective; if drug treatment is being considered for someone with a BMI higher than 50 kg/m2; if specialist interventions such as a very low calorie diet may be indicated; or, if surgery is being considered.

5.5.1 Tier three weight management services

In line with recommendations, T3WMSs are designed and commissioned locally (Health and Social Act, 2012; Obesity Care Pathways, 2014), meaning that there is no standardised service specification. Multidisciplinary teams (MDTs) are recommended within T3WMSs (British Psychological Society [BPS], 2019; NICE, 2014; O'Keeffe, 2016) but the composition of MDTs varies between services, meaning that some disciplines may be under- or over-represented, which could mean that a holistic view of the service users' clinical needs cannot be formulated and that a range of evidence-based interventions cannot be provided due to a lack of appropriately trained staff, which limits the range of available interventions (Brown et al., 2017).

The BPS (2019) state that there is a need for clear and detailed guidance for T3WMSs, which include examples of evidence-based practice that addresses individual factors. The lack of clear guidance may be partially accounted for by the lack of national service specification and by a lack of research exploring the effectiveness of T3WMSs.

5.5.2 Effectiveness of weight management services

There are few studies which have assessed the effectiveness of U.K. T3WMSs and reviews have merged findings relating to formal T3WMSs and multidisciplinary weight management services, making it difficult to separate the two (Alkharaiji et al., 2019; Brown et al., 2017). It would be inappropriate to generalise results from tier two service evaluations as service users accessing T3WMSs are likely to have more complex physical and psychological treatment needs (Brown et al., 2017; NICE, 2014).

Kininmonth and Bradbury (2016) evaluated the effectiveness of the Wakefield T3WMS across 12 weeks of treatment. Only 16% of participants lost ≥5% of their initial body weight and were considered "successful" and the programme had an attrition rate of 32%, indicating that it was not effective for most participants.

Brown et al. (2017) conducted the first systematic review of tier three services for adults in the U.K. The researchers reviewed 14 studies and provided a narrative synthesis of findings as meta-analysis was not possible due to the heterogeneity of studies. Only seven of these studies utilised T3WMSs in the consideration of weight loss, and only four studies provided follow-up weight comparisons. These studies reported that 23.9-51.2% of participants lost ≥5% of their initial body weight, which may indicate that some T3WMS are effective in helping participants lose a clinically significant amount of weight, but the study could not establish why. The systematic review considered the impact of sociodemographic factors in

relation to treatment effects and reported inconsistent results for age, baseline BMI, sex and deprivation (however the definition of deprivation was unclear).

Alkharaiji et al. (2019) systematically reviewed tier three and MDT weight management services to explore effectiveness in relation to weight and comorbid difficulties. Through their narrative synthesis, the researchers concluded that these interventions helped to reduce participants' weight but without statistically rigorous analyses, it is difficult to say this with certainty. Few studies reported secondary longitudinal outcome measures, such as at three or six-months after interventions began, meaning the researchers were unable to comment on the impact of interventions on outcomes such as glycated haemoglobin levels, fasting blood sugar levels, insulin use, cholesterol levels, blood pressure, and physical activity.

Prihartadi et al. (2020) explored predictors of weight loss in the Hull University Teaching Hospitals NHS Trust T3WMS. The researchers collected data regarding the participants' age, sex, baseline weight, severe mental health diagnoses, health conditions relating to obesity and experience of depression or anxiety. Logistic regression analysis indicated that older age, having type two diabetes and having a diagnosis of dyslipidaemia, were independently positively associated with a weight loss of ≥5% three months later. As Prihartadi et al. utilised a cross-sectional design, the research cannot account for why these three factors contributed to a greater likelihood of weight loss success, although the researchers did speculate that older people and those living with the two conditions may be more motivated to lose weight. It is noteworthy that diabetes, and dyslipidaemia may be influenced by eating behaviour.

Although narrative systematic reviews are useful in exploring existing literature, they are limited in making claims regarding effectiveness. Brown et al. (2017) noted that none of their reviewed studies reported on behaviour change, meaning that it was not possible to explore how factors like diet or exercise may have contributed to weight change. Neither Brown et al. (2017) or Alkharaiji et al. (2019) considered the mechanisms of change which led to reductions in weight, but having a better understanding of the mechanisms of change may improve interventions.

Research suggests that people who are more likely to lose a clinically significant amount of weight in tier three services have a higher weight at the start of treatment (Brown et al., 2017; Prihartadi et al., 2020). Furthermore, the people most likely to complete interventions are those with a higher weight at the start (Brown et al., 2017; Prihartadi et al., 2020). Brown et al. (2017) reported attrition rates of 13-89% in T3WMSs, and this may indicate that service users were unsatisfied with intervention.

5.6 Utilising appetitive trait research in weight management services

Appetitive profiles vary between individuals, and it is possible to score highly on both food approach and food avoidance traits. Each trait exists on a spectrum, and it has been suggested that some traits may be linked, for example H and FR have been found to positively correlate (Hunot et al., 2016), and positive associations have been observed between FR and EOE (Hunot et al., 2016; Hunot-Alexander et al., 2021).

Although no studies to date have explored associations between successful weight loss and appetitive traits as measured by the AEBQ, research using other measures of appetite indicates these traits may be important. For example, recent research has indicated that high SR is associated with greater weight loss in individuals participating in weight management interventions (Arguin et al., 2017; Buckland et al., 2019). Arguin et al. (2017) evaluated the impact of an unrestricted satiating diet in 69 men living with obesity over 16 weeks. Participants' SR was measured by subjective ratings of fullness and desire to eat following a standardised meal. Regardless of whether participants were in the control or experimental group, those with a higher SR lost the greatest amount of body weight, for example more than 5%, compared to less than 5% for those with low SR.

Buckland et al. (2019) compared the weight loss of 52 women who partook in a 14-week weight management programme and reported high or low SR, as measured by calculating a Satiety Quotient (SQ). SQs are used to measure a person's satiety efficiency, how sated a person feels, following a meal devised based on the person's estimated individual daily energy needs (Dalton et al., 2015). The SQ is akin to the SR subscale within the AEBQ but is derived in laboratory conditions which may not reflect satiety response in daily life. Buckland et al. (2019) reported that women with high SR lost more weight and had greater reductions in waist circumference. The reductions in weight for each phenotype were comparable to those reported by Arguin et al. (2017), who exclusively utilised a male sample, suggesting that low SR is linked with poorer weight loss success for either sex. However, one study which included both men and women reported finding no relationship between SR and weight loss success (Drapeau et al., 2019). It has been suggested that diet may influence the impact of low SR; following a satiating diet may have fewer consequences for those with low SR compared to a diet focused on energy restriction (Drapeau et al., 2019).

5.7 Rationale for research

There is limited research surrounding the effectiveness of T3WMSs and there is significant variability in responses to weight management interventions (Stubbs et al., 2011). It has been proposed that actively engaging in weight management may impact the expression of

appetitive traits, or that individuals' may have a greater awareness of their appetitive traits' when actively managing weight (Hunot-Alexander et al., 2021). Individual variation in appetitive traits may also account for different responses to weight management interventions, so understanding the relationship between appetitive traits and weight management could contribute to more effective, individualised care. At the time of writing, it appears that no published studies have explored the appetites of individuals engaged in a T3WMS, whether individual appetites (as measured by the AEBQ) and weight loss are related, or explored individuals' experiences of appetitive traits during weight management.

5.8 Research aims

This study aims to explore the appetitive traits of adults accessing a T3WMS; whether appetitive traits are related to weight loss of 5% or more; and service user's views of their appetitive traits during engagement with the T3WMS. Three research questions will be explored using a mixed-methods approach:

1) What are the appetitive traits of people accessing a T3WMS?

2) Are appetitive traits related to weight loss success in the T3WMS?

3) What are participant's views of appetitive traits during weight management?

6 Method

6.1 Design

The understanding of appetitive traits as measured by the AEBQ in relation to weight management is limited. Mixed methods approaches are a comprehensive way to build understanding of phenomena as they address what a concept is through quantitative data and explore why phenomena occur through qualitative data (Watkins & Gioia, 2015). A mixed-methods approach overcomes the individual limitations of quantitative and qualitative paradigms by integrating findings to inform the interpretation of data, and create a better understanding of phenomena (Creswell, 2014; Tashakkori & Teddlie, 2003). The BPS and NICE have promoted the use of qualitative and mixed-methods approaches (Braun & Clarke, 2023; NICE, 2012) and acknowledge that qualitative research can inform policy.

A convergent mixed method design was utilised as the research questions were independent of one another (Creswell & Creswell, 2018). Creswell (2014) proposed a four-step process for convergent mixed-methods design. In stage one, respective data collection occurs. In stage two, each data type is independently analysed. The two sets of data are merged by comparing the findings side-by-side to detect areas of convergence and divergence in stage three. Finally, the merged results are interpreted and explained, with key themes and variables identified that transcend the quantitative and qualitative results.

6.1.1 Ontology and epistemology

The mixed methods design meant that two ontological approaches were utilised; this is a common pragmatic occurrence within mixed methods and researchers justify each standpoint in relation to research questions (Giacomini, 2013). Pragmatism suggests that problems can be approached in many credible ways, with different methodologies (Giacomini, 2013). For questions one and two, utilising quantitative data, a realist ontological standpoint was taken with a positivist epistemology. For question three, an idealist ontological standpoint with interpretive epistemology was taken. As the lead researcher, I recognised that my own world viewpoint was grounded in idealism and social constructionism.

Realism assumes that the world has empirically accessible processes which are independent of our ideas, meaning that it is possible to collect data freely without influence of bias of one's perspective and values (Giacomini, 2013). Positivism posits that there is a single reality which may be uncovered by testing hypotheses (Lincoln et al., 2011), using quantitative approaches to confirm or rejected hypotheses. Unfortunately, positivism cannot meaningfully describe the different experiences of individuals (Cohen et al., 2011). Therefore, an alternative paradigm was sought to balance the limitations of positivism.

Idealism posits that we have access only to our ideas and subjective experiences, meaning that research can only uncover mental constructs of the world as any data does not directly link to a reality (Giacomini, 2013). Interpretive epistemology suggests that there are multiple truths, each dependent on an individual's ideas and experiences (Lincoln et al., 2011); people can form different interpretations so multiple viewpoints are important to explore in research (Blumer, 1969). The interpretivism paradigm is limited by the researcher's ability to understand participants' experiences fully (Bernstein, 1974); a researcher is part of the constructed social world and cannot therefore be objective (Giacomini, 2013). Allen (1985) suggests that interpretivism is dependent on subjectivity, so different people may detect various patterns in human experience. Therefore, researchers present findings with context, and acknowledge that other interpretations are possible (Giacomini, 2013).

6.1.2 Service user involvement

An expert by experience reviewed and consulted on the development of the interview schedule and joined the University of Leeds research panel which reviewed the feasibility and clinical utility of the research. The expert advised that some participants may experience anxiety regarding potential weight-related judgements, and the use of videoconferencing technologies, and therefore recommended interviews be conducted via telephone only.

6.1.3 Ethical clearance

Ethical approval was sought through the Integrated Research Applications System (IRAS). The research was sponsored by the University of Leeds. The research was reviewed by the Fulham Rec and given approval on 14th February 2022; subsequent amendments were sought and approved (see Appendix A).

6.1.4 Setting

The study was conducted in the Leeds Adult Specialist Weight Management Service, a T3WMS. The Leeds Adult Specialist Weight Management Tier Three Service provides 12-month interventions for adults living with severe obesity. The service provides a range of interventions to help people lose weight, including educational and supportive groups, individual dietician support, physiotherapy, psychological interventions, and behaviour support. The service is delivered by a MDT comprised of consultant physicians, physiotherapists, dieticians, and mental health professionals. The service is led by Leeds Community Healthcare NHS Trust in partnership with the Leeds Teaching Hospitals NHS Trust and the Leeds and York Partnership NHS Foundation Trust.

Initial recruitment was slower than anticipated and this may relate to the impacts of COVID-19, and the T3WMS's remote delivery of services during the recruitment period.

Once ethical approval was granted, there were uncertainties about organisational procedures, resulting in a three-month delay to starting recruitment. Initially, the consent process required back and forth emails between prospective participants and the research team, this was thought to negatively impact recruitment, and an ethical amendment was made to allow prospective participants to complete all research activities online; these differences are fully outlined in section 6.4.1. As recruitment rates remained low, another amendment was made to allow the T3WMS to invite service users involved in groups to the research, and for a service wide email to be sent to all T3WMS service users. A further attempt to recruit participants from the community, but this was unsuccessful. Further details about the rationale, design and procedure for community recruitment are available in Appendix B.

6.2 Participants

6.2.1 Inclusion criteria

Participants were required to be engaged with the Leeds Adult Specialist Weight Management Service and, to be able to understand both written and verbal English. Referral criteria for the Leeds Adult Specialist Weight Management Service include: aged 18 or over, registered at a General Practice within Leeds CCG; a BMI of 40kg/m^2 or more, or between 35 kg/m^2 and 40kg/m^2 in the presence of other significant diseases which would improve with weight loss; has engaged with a weight loss service for at least 12 weeks in the last 12 months to reduce or maintain their weight; and, is willing to engage with another service and understands this will require further time commitment on their part.

6.2.2 Exclusion criteria

Service users who had previously had bariatric surgery or had gastric procedures, such as gastric balloons, were excluded from the study as it is unclear how bariatric surgery may impact appetitive traits (Gero et al., 2017).

6.2.3 Sample size

As the research was exploratory and time-limited, participant recruitment was pragmatic. Service managers reported that around 320 people accessed the service annually, with 30-40 referrals monthly. It was anticipated that not all service users would wish to take part, and that some would meet the exclusion criteria. It was estimated that approximately 60% of eligible service users would consent over a 12-month period. Therefore, the research aimed to recruit 200 participants.

6.3 Measures

6.3.1 Demographic and weight history information

Demographic information was collected to allow for the control for demographics factors in analyses; these forms are presented in Appendix C. As the lead researcher, I

generated questions based on the standard evaluation framework for weight management interventions (Public Health England, 2018b), standard service data collected, and the desire to contextualise participants' weight management history. The data routinely gathered by the service data was collected from participants' medical records, including interventions in the service.

The following data was gathered: age; sex; ethnicity; employment status; education level; diagnosed physical and mental health conditions; and weight history including when participants first struggled with their weight, number of previous T3WMS engagements, number of formal weight loss programme (e.g., Slimming World, One You Leeds); and, number of self-directed weight management attempts.

6.3.2 Weight measurements

The T3WMS collects service users' body weight at the beginning of intervention, the middle and end. Intervention usually lasts 12 months, meaning weight is collected every 6 months. Weight measurements were collected from medical files until participants' involvement with the service ended, or the research ended; whichever occurred first.

Participants' weight measurements in kilograms (kg) were collected from medical records, beginning at the point of referral to the service until the end of their involvement with the service, or the research ended; whichever occurred first. It was not possible to determine whether weight was self-reported or measured by the T3WMS, therefore all measurements were assumed to be self-reported. When recent weight measurements were not available, an email requesting weight measurements was sent to participants (see Appendix C.3).

6.3.3 Adult Eating Behaviour Questionnaire

The Adult Eating Behaviour Questionnaire (AEBQ; Hunot et al., 2016) is a 35-item self-report questionnaire which takes around five minutes to complete. The AEBQ has eight validated factors, four of which address approach behaviours and four relate to avoidance behaviours. The questionnaire has been validated in Saudi Arabia, Canada, the U.K., Australia, China, Bulgaria, U.S., Iran and Mexico (Alruwaitaa et al., 2022; Cohen et al., 2021; He, Sun, et al., 2021; Hristova, 2018; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019). These studies have demonstrated that the AEBQ has good test-retest reliability, internal consistency, concurrent validity, convergent and divergent validity. The AEBQ is currently the most comprehensive assessment of appetitive traits available, as it measures eight appetitive traits, including satiety responsiveness.

As people accessing the T3WMS are required to completed numerous measures as part of their routine care, utilising one comprehensive measure ensured that participants

would not be burdened. While satiety responsiveness could have been measured by calculating a SQ, this would have required a laboratory setting, more time from participants and research team time requirements beyond the scope of the project and of staff working with the T3WMS, who experience high service demands. All participants completed the AEBQ on entry to the study and those who engaged in an interview repeated the AEBQ before interview (see Appendix D).

AEBQ average trait scores were calculated by summing scores for each question related to that trait and dividing by the total number of questions. Higher scores for food approach traits are indicative of a more avid appetite. For example, a high H score suggests that a person experiences physical hunger more frequently, a high FR score indicates that a person experiences high responsiveness to food or food cues, a high EOE score indicates that a person overeats when experiencing strong emotions, and a high EF score indicates that a person derives much enjoyment from food. High scores on food avoidance traits are indicative of a less avid appetite. A high SR score indicates that a person feels full more quickly, or is more able to recognise feelings of satiety, a high EUE score indicates that an individual will eat less when experiencing strong emotions, a high FF score indicates an individual is fussy or selective with foods, and a high SE score indicates that an individual will eat more slowly.

6.3.4 Interview schedule

The interview schedule was devised by the lead researcher, in collaboration with the research team. To help interviews feel comfortable during the interview, the schedule began with an introduction of the interviewer (the lead researcher), by revisiting the purpose of the interview, the expected duration of the interview, and the participants right withdraw consent from the interview at any time.

To help orient participants to the topic of weight management, the first question asked participants to consider their experience of weight management more generally. “Thinking back on your life, when did you first struggle with weight?”. Similarly, participants were asked how they would describe appetite, and were provided with information about appetitive traits, to help create a shared understanding during the interview. Interview questions focused on each of the eight appetitive traits measured by the AEBQ. Interviewees were provided with a description of a specific appetitive trait, then asked about how their experience of the trait. For example, “People can have high food responsiveness, as they may always be thinking about food or want to eat if they see or smell food. For example, if they walk past a bakery they will notice it and it may trigger cravings, whereas someone with low food responsiveness may not even notice the bakery. How does this trait fit with your experience?”. Each question in the schedule had several

prompts for the interviewer to use, to ensure that in-depth information was generated during the interviews, and a standard follow-up question was to ask how the interviewee perceived a trait may impact upon their weight management. After addressing each trait, participants were asked "has the way you experience appetitive traits changed since engaging with tier 3 weight management services?", and whether they felt that their appetite had impacted "success with tier 3 weight management services in general".

At the end of the interview, the interviewer gave interviewees information about who to contact for support if needed. This included their clinical team within the T3WMS, their local Single Point of Access or Samaritans. Brief information was given about next steps in the research, including transcription and analysis.

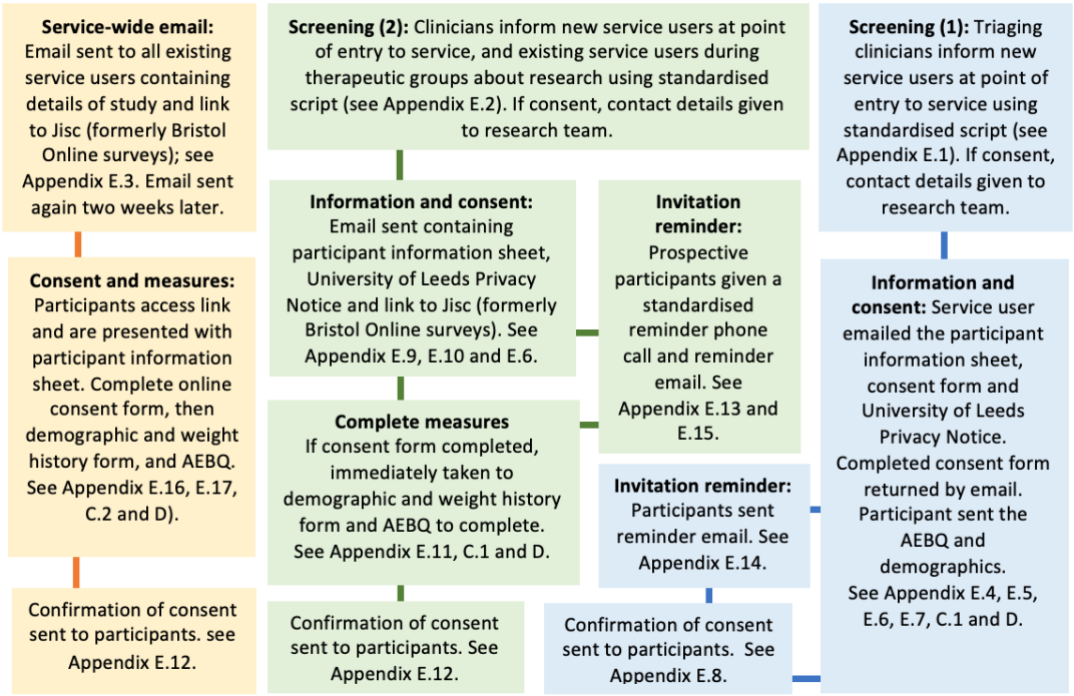
6.4 Procedure

6.4.1 Participant identification, approach, and informed consent

The participant identification, approach and informed consent process is shown in Figure ***6.1***. For screening one and two, service users were required to verbally consent to their name, email address and NHS number being shared with the research team, through a secure dedicated NHS email address. Due to limited email responses, the recruitment procedure was changed to make it easier for participants; "screening (2)". Participants were provided with a unique participant number to preserve confidentiality and allow questionnaire data to be linked with measures of weight collected from medical records.

The consent form included consent to access medical records, and optional consent to: (a) engage in a semi-structured interview; (b) receive information about appetitive traits and how to manage these at the end of the study; (c) to receive a summary of the study findings.

Figure 6.1
Participant identification, approach, consent, and measures



6.4.2 Withdrawal of consent

Participants could withdraw consent at any time, without reason or impact on their care. No participants withdrew from the study.

6.4.3 Interview selection and procedure.

A sub-sample of participants were invited to take part in a telephone interview. To ensure that interviewees reflected a range of lived experiences, participants were selected based on their demographic data and the time since they were referred to the service. For those interested, a convenient time and date was arranged (see Appendix F.1). A reminder email was sent one week before the interview, requesting interviewees to complete the AEBQ once more, to prepare interviewees for the types of questions they would be asked and allow time for reflection (see Appendix F.2).

All interviews were conducted between August 2022 and February 2023 by telephone and audio recorded on a secure Dictaphone. A semi-structured interview schedule was used (see Appendix F.3) to explore points important to interviewees which were relevant to appetitive traits. Throughout the interviews, interviewees were monitored for signs of distress. When needed, emotional support was provided, and at the end of each interview participants were asked how they were feeling and provided information about sources of support should they need these. Interviews were transcribed non-verbatim by a University of Leeds approved transcriber.

6.4.4 Data protection

All research data was pseudonymised and stored securely on encrypted devices and secured networks. Pseudonyms were created for interviewees, and these are reported with quotes in the results section. Furthermore, quotes were purposefully selected to maintain the interviewees anonymity.

6.5 Analysis

All quantitative calculations were conducted using IBM SPSS, version 27. Descriptive statistics were run to summarise participants' demographic information; not all participants provided exact ages they first experienced overweight or obesity, so a midpoint was calculated based on their age description. There was no missing data among those who completed the AEBQ and the demographic and weight history form; one person did not complete these measures, so their data was not used in statistical analyses, only in descriptive data for the interview sample.

A weight reduction of 5-10% has been shown to improve health outcomes and is considered a standard goal within weight loss interventions (Astrup & Pedersen, 2010; Brown et al., 2016; Magkos et al., 2016), therefore reductions greater than 5% were considered clinically significant for this research.

6.5.1 Quantitative analysis

The AEBQ was scored per published instructions, see section 6.3.3. Descriptive statistics, including the mean, standard deviation and range of each trait were calculated.

Logistic regression analyses were used to explore whether five AEBQ-measured appetitive traits (FR, EOE, EUE, SE and SR) were related to weight loss success. These traits were selected for inclusion in analyses as previous literature (presented in section 5.4.1.2) suggested that, of the eight-factor AEBQ-measured appetitive traits, these five showed the most consistent relationships with body weight. A small number of co-variates were used in line with the revised 10:1 recommendation devised by Peduzzi et al. (1996), these included demographic variables theoretically related to appetitive traits and weight (gender, age, age at first overweight, time between first and last weight measurement). The validity of analyses was explored by calculating the tolerance and variance inflation factors (VIF).

Success was defined body weight reduction of 5% or more from the first weight measurement to the last; the number of days between these was controlled for in the analyses. Separate logistic regression models were run for each appetitive trait to ensure that the assumption of multicollinearity was met. Logistic regressions assume that there is linearity, independence of errors and multicollinearity (Field, 2009, p. 273). Linearity assumes that weight loss had a linear relationship with appetitive traits; this was checked

through binary logistic regression models which included the interaction of predictors and their log of the outcome variable. In relation to independence of errors, participants AEBQ scores and weight were used at only one time-point. Finally, the assumption of multicollinearity (that predictors including the trait included in the model, age, age at first overweight, gender and the number of days between the first and last weight measurement, were not too highly correlated), was checked through tolerance and VIF statistics. The assumptions of logistic regression were met.

Calculating a valid sample size was difficult as previous research has not explored the influence of appetitive traits on weight loss. While previous research has explored weight loss success in T3WMSs but they have not utilised control groups to compare services to independent weight loss attempts (Brown et al., 2017). Previous research has not explored the influence of appetitive traits upon weight loss in a T3WMS, nor has it explored the influence of individuals' appetitive traits upon managing weight independent of weight management services. Some research has considered how satiety responsiveness impacts weight loss success (Arguin et al., 2017; Buckland et al., 2019), but it would be inappropriate to generalise this trait finding to other traits to calculate power here. Therefore, findings here should be considered cautiously and may have low statistical power.

6.5.2 Qualitative analysis

6.5.2.1 Reflexive Thematic Analysis

Qualitative interview data was analysed using interpretative reflexive Thematic Analysis (iRTA) to identify key themes (Braun & Clarke, 2012); TA was chosen as it is theoretically flexible (Braun & Clarke, 2013) and therefore compliments the dual epistemologies of this mixed-methods research. Braun and Clarke (2006, 2021a) outline six phases within reflexive Thematic Analysis (RTA): data familiarisation and writing familiarisation of notes; systemic data coding; generating initial themes from coded data; developing and reviewing themes; refining, defining and naming themes, and, writing the project. Braun and Clarke (2021a) note that these phases can merge, creating an increasingly recursive process. The process was undertaken in NVivo, release 1.7.1 (QSR International Pty Ltd., 2020).

Due to the exploratory nature of the research questions, an inductive approach to analysis was mostly taken to ensure that analysis was grounded in the data and would best represent meaning as given by interviewees (Braun & Clarke, 2013, 2021a); a degree of deductive analysis was utilised to ensure the production of themes relevant to the research question by focusing on how participants' responses related to specific appetitive traits.

RTA emphasises that both the theoretical assumptions of analysis, and the researcher (through their interpretations, skills and resources) shape analysis of data (Braun & Clarke, 2019). RTA is an interpretative activity, in which the researchers' social, cultural, and ideological positionings impact results.

I compared all transcripts with the original audio to ensure accuracy; one interview was too quiet for reliable transcription; no quotes are reported from this interview, but codes were compared to those in other transcripts. Throughout analysis, I shared my interpretations, coding and ideas for initial themes in supervision meetings.

Braun and Clarke (2023) state that quality checks must match the epistemology of research. While some have proposed that data saturation (reaching a point at which no new themes or codes are identified) is needed, Braun and Clarke (2021b) argue that the saturation relates to neo-positivist forms of TA, meaning saturation is incompatible with the assumptions of RTA. Within RTA, validity and reliability of analysis are formed through shared interpretation of data, and the development of themes; coding frameworks are not used and it is important to note that consensus is not an aim (Braun & Clarke, 2021a). To facilitate a shared interpretation of data, qualitative data analysis was regularly discussed in research supervision, and notes were made for each stage of data analysis. Analysis was also informed by best practice recommendations (Braun & Clarke, 2021a, 2023).

The research team met to discuss interview excerpts and their relation to appetitive traits. This was achieved by mapping themes onto appetitive traits. Working reflexive teams can increase quality as team members can draw-on one another's expertise (Lyons, 2011). The research team familiarised themselves with a subset of transcripts to increase data familiarisation. Codes and themes were discussed until themes were thought to accurately represent the experiences of participants (see Appendix G). Braun and Clarke (2023) advocate the idea of an analytic story as being a useful tool for reflexive TA, to ensure that analysis is cohesive and themes are nuanced, rather than multi-level. This was held in mind during the meeting.

6.5.3 Reflexivity

The background and worldview of researchers can impact how data is interpreted and shape research findings (Kacen & Chaitin, 2006). To reflect the influence and active role of researchers, and to facilitate coherent reflexivity (Berger, 2015), the actions of the lead researcher are described in the first person. As the lead researcher, I recognised my experience of living with overweight and obesity and how this made me an 'insider' to some extent (Labaree, 2002); professional experience may move a researcher from an 'outsider' to an 'insider', as professionals experiences lead to an increased insight into the experiences of a group (Berger, 2015). Both Dr Beeken and Dr Fildes are experienced behavioural

scientists with expertise in appetite and obesity research. Dr Menon is a Psychiatric Consultant with Royal College of Psychiatry with endorsement in Liaison Psychiatry, who has a special interest in bariatric services and professional experience of tier three and tier four services. The researchers and I all identified as female, with three identifying as White-British.

It is possible that my role as a Trainee Clinical Psychologist may have also influenced interviewees, by eliciting ideas of what a psychologist may expect to hear, or how interaction with me may influence future care within T3WMS (despite explicit statements that I was not part of the team). Furthermore, my job role, training and professional experiences may have influenced my interpretation of qualitative data, perhaps by being more likely to recognise potential psychological themes, or psychological connections between themes.

7 Results

7.1 Description of participants

7.1.1 Sample recruitment routes

Participants were recruited through two routes: contact with clinicians and through a service-wide email. Overall, 225 service users gave consent to be contacted, and 87 consented to participating. However, five did not complete study measures, so were excluded from the data set. This resulted in 82 participants.

The service-wide email was sent all service users of the T3WMS in October 2022; 526 service users. A reminder email was sent to all service users two weeks later. Two participants consented and completed study measures through this route, a response rate of .38%.

A total of 84 participants contributed to the dataset.

7.1.2 Demographic information

Table ***7.1*** presents the demographic information for the participant samples related to each research question. Data relating to ethnicity and employment was gathered from medical files, in the hope that this would reduce time needed for participants to take part in the research. However, much of this data was either missing or unclear, so is not reported here to avoid potentially misrepresenting the participants of this research.

Table 7.1
Demographic information of participants for each research question

Demographic variable	Total sample (*N* = 84)	Pre-post weight sample (*N* = 75)	Interview sample (*N* = 22)
Gender *n* (%)			
Male	20 (23.81)	17 (22.67)	5 (22.73)
Female	64 (76.19)	58 (77.33)	17 (77.27)
Mean Age (*SD*)	43.82 (11.88)	44.40 (11.61)	48.27 (11.21)
Education *n* (%)			
No formal education	4 (4.76)	4 (5.33)	2 (9.09)
High school education	24 (28.57)	21 (28.00)	4 (18.18)
College/NVQ	38 (45.24)	35 (46.67)	10 (45.45)
Undergraduate degree	11 (13.10)	10 (13.33)	4 (18.18)
Postgraduate degree	7 (8.33)	5 (6.67)	2 (9.09)
Relationship status *n* (%)			*
Divorced	3 (3.57)	3 (4.00)	2 (9.09)
In a relationship	20 (23.81)	17 (22.67)	5 (22.73)
Married	41 (48.81)	37 (49.33)	10 (45.45)
Separated	2 (2.38)	2 (2.67)	1 (4.55)
Single	18 (21.43)	16 (21.33)	3 (13.64)
Weight M (*SD*)			*
Age first living with overweight	16.39 (11.38)	16.33 (11.70)	16.52 (13.75)
Weight (kg) at joining T3WMS	131.13 (22.74)	130.96 (22.31)	134.88 (27.51)
Days since referred to service at weight 1	89.44 (165.52)	79.83 (169.00)	119.50 (206.67)
Range of days for weight 1	1144.00	1144.00	950.00
Number of days from first to last weight	n/a	199.41 (144.45)	187.95 (90.43)
Weight change during T3WMS engagement *n* (%)			-
Achieved 5% loss *n* (%)	n/a	17 (22.67)	6 (27.27)
Weight stayed same *n* (%)	n/a	49 (65.33)	13 (59.09)
Gained weight *n* (%)	n/a	9 (12.00)	2 (9.09)

Demographic variable	Total sample (N = 84)	Pre-post weight sample (N = 75)	Interview sample (N = 22)
Formal weight management M (*SD*)[a]			*
Average number of attempts	3.37 (3.32)	3.49 (3.43)	3.81 (4.38)
Slimming World	1.54 (2.25)	1.63 (2.35)	1.57 (2.52)
Weight Watchers	.71 (1.25)	.75 (1.27)	.76 (1.34)
One You Leeds	.54 (.68)	.55 (.70)	.86 (.85)
'Other'	.58 (1.06)	.57 (1.06)	.62 (1.20)
Physical and mental health *n* (%)			*
Living with physical health diagnoses	49 (58.33)	44 (58.67)	13 (59.09)
Using physical health medication	63 (75.00)	56 (74.67)	17 (77.27)
Living with diabetes	8 (9.52)	8 (10.67)	3 (13.64)
Living with psychological diagnoses	40 (47.62)	33 (44.00)	10 (45.45)
Using psychological health medication	40 (47.62)	33 (44.00)	9 (40.91)
Living with eating disorder	2 (2.38)	2 (2.67)	0 (.00)
Previous T3WMS engagement *n* (%)			*
Never engaged before	72 (85.71)	65 (86.67)	18 (81.82)
One previous engagement	8 (9.52)	6 (8.00)	3 (13.64)
Two previous engagements	2 (2.38)	2 (2.67)	0 (.00)
Three previous engagements	1 (1.19)	1 (1.33)	0 (.00)
Four previous engagements	1 (1.19)	1 (1.33)	0 (.00)
T3WMS interventions *n* (%)[b]			
One intervention only	19 (22.62)	17 (22.67)	3 (13.64)
Two interventions	48 (57.14)	42 (56.00)	11 (50.00)
Three interventions	13 (15.48)	13 (17.33)	5 (22.73)
Four interventions	3 (3.57)	2 (2.67)	3 (13.64)
Five interventions	1 (1.19)	1 (1.33)	0 (.00)

Note. [a]'Other' formal weight management programmes included the Cambridge Diet, Lighter Life, New Leaf, Noom, Rosemary Conley and Second Nature. [b]Interventions received in the service included dietetics, physiotherapy, a binge eating group, cognitive behavioural therapy and psychiatric support. * = n(21) as one participant did not complete demographics. - = one participant did not have a follow-up weight measurement.

7.2 Question one: what are the appetitive traits of people accessing T3WMS?

The average scores for each of the AEBQ appetitive traits are presented in Table ***7.2***. It is not possible to comment whether scores for individual traits were 'high' or 'low' as standardised norms have not been calculated for the general population, or for those living with overweight or obesity.

Table 7.2

The average appetitive trait scores of each sample

Appetitive trait (minimum score, maximum score)	Total sample *N* = 84		Pre-post sample *N* = 75		Interview sample *N* = 21	
	Mean (*SD*)	Range	Mean (*SD*)	Range	Mean (*SD*)	Range
Hunger	3.00 (.80)	3.80	2.97 (.77)	3.80	2.85 (.87)	3.40
Food Responsiveness	3.29 (.87)	4.00	3.26 (.87)	4.00	3.15 (.68)	2.75
Emotional Over Eating	3.38 (1.21)	4.00	3.39 (1.12)	4.00	3.44 (1.20)	4.00
Enjoyment of Food	4.04 (.87)	4.00	4.03 (.88)	4.00	3.78 (.89)	3.00
Satiety Responsiveness	2.57 (.90)	4.00	2.65 (.90)	4.00	2.60 (.77)	2.75
Emotional Under Eating	2.38 (.98)	4.00	2.35 (.92)	4.00	2.25 (.86)	2.60
Food Fussiness	2.44 (1.02)	4.00	2.44 (1.00)	4.00	2.54 (.82)	3.60
Slowness in Eating	2.47 (1.01)	4.00	2.57 (.99)	4.00	2.52 (.95)	3.00

Note. Respectively, the minimum and maximum scores for each appetitive trait are as follows: H (5-25), FR (4-20), EOE (5-25), EF (3-15), SR (4-20), EUE (5-25), FF (5-25), SE (4-20).

Within the total sample, the skewness standard error was .26, and the kurtosis standard error was .52. For the pre-post sample the skewness standard error was .28, and the kurtosis standard error was .55. The interview sample had a skewness standard error of .50 and a kurtosis standard error of .97.

It is noteworthy that within the total sample, the distribution of average scores for EF (z = -3.53, p < .01), EUE (z = 2.19, p < .05) and FF (z = 3.46, p < .00) were statistically significantly skewed and EF (z = 1.97, p <.05) evidenced significant kurtosis. This meant that participants generally had higher scores for EF, and lower scores for EUE and FF.

Within the pre-post sample, scores for EF ($z = 3.49$, $p < .01$) and FF ($z = 3.24$, $p < .05$) were significantly skewed, and EF ($z = 2.30$, $p < .05$) evidenced significant kurtosis. This meant that pre-post participants generally had higher scores for EF, and lower scores for FF. Within the interview sample, no trait scores were skewed or showed evidence of kurtosis. For all samples, the coefficient of variation was less than one, indicating that scores were relatively close to the sample mean.

7.3 Question two: are appetitive traits related to success in the T3WMS?

In total, 75 participants had weight measurements on more than one occasion and were included in these analyses; nine participants had only one weight measurement and were therefore excluded. The traits FR, EOE, SR, SE and EUE were selected for inclusion in analyses as previous literature (presented in section 5.4.1.2) show these to have the most consistent relationship with BMI. Five logistic regression analyses were performed to examine whether appetitive traits were associated with a weight loss of 5% or more. A small number of demographics variables were selected as covariates based on their relationship to weight and the research question.

7.3.1 FR and weight loss success

The unadjusted logistic regression model exploring the relationship between FR and 5% weight loss was not statistically significant ($\chi 2$ (1) = 2.50, $p = .11$). The model explained 4.98% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 77.33% of cases.

The adjusted logistic regression model including FR and the demographic covariates was not statistically significant ($\chi 2$ (5) = 8.82, $p = .12$). The model explained 16.88% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 76.00% of cases. Participants' FR score, age, gender, age at first living with overweight, and the number of days since referred to the T3WMS were not associated with successful weight loss.

Table 7.3
Logistic regression exploring the relationship between FR and likelihood of achieving 5% weight loss

	Unadjusted model				Adjusted model			
	Odds ratio	*p*	95% CI for OR		Odds ratio	*p*	95% CI for OR	
			LL	UL			LL	UL
FR	.60	.12	.32	1.14	.68	.29	.34	1.37
Age (years)					1.05	.12	.99	1.11
Gender (male)					.40	.32	.07	2.47
Age first overweight (years)					1.01	.59	.96	1.01
Number of days between first and last weight					1.00	.38	1.00	1.01
Constant	1.45	.72			.07	.15		

7.3.2 EOE and weight loss success

The unadjusted logistic regression model exploring the relationship between EOE and 5% weight loss was not statistically significant ($\chi 2$ (1) = .19, p = .67). The model explained .38% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 77.33% of cases.

The adjusted logistic regression model including EOE and demographic variables was not statistically significant ($\chi 2$ (5) = 7.91, p = .16). The model explained 15.22% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 81.33% of cases. Participants' EOE score, age, gender, age at first living with overweight, and the number of days since referred to the T3WMS were not associated with successful weight loss.

Table 7.4
Logistic regression exploring the relationship between EOE and likelihood of achieving 5% weight loss

	Unadjusted model				Adjusted model			
	Odds ratio	*p*	95% CI for OR		Odds ratio	*p*	95% CI for OR	
			LL	UL			LL	UL
EOE	.91	.67	.58	1.42	.88	.62	.52	1.48
Age (years)					1.05	.09	.99	1.11
Gender (male)					.32	.21	.06	1.86
Age first overweight (years)					1.01	.70	.96	1.07
Number of days between first and last weight					1.00	.37	1.00	1.01
Constant	.41	.27			.03	.04		

7.3.3 SR and weight loss success

The unadjusted logistic regression model exploring the relationship between SR and 5% weight loss success was positive and statistically significant ($\chi 2$ (1) = 10.64, p = .00). This indicates that higher scores on SR were positively associated with achieving 5% weight loss. The model explained 20.129% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 82.67% of cases.

The adjusted logistic regression model including SR and demographic variables remained statistically significant ($\chi 2$ (5) = 17.18, p = .00). The model explained 31.15% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 80.00% of cases. As shown in Table ***7.5***, higher SR scores and an older age were both statistically significant predictors of weight loss of 5% or more.

Table 7.5
Logistic regression exploring the relationship between SR and likelihood of achieving 5% weight loss

	Unadjusted model				Adjusted model			
	Odds ratio	*p*	95% CI for OR		Odds ratio	*p*	95% CI for OR	
			LL	UL			LL	UL
SR	2.96	.00*	1.43	6.10	3.15	.01*	1.38	7.17
Age (years)					1.07	.05*	1.00	1.14
Gender (male)					.53	.53	.07	3.92
Age first overweight (years)					1.00	.91	.94	1.06
Number of days between first and last weight					1.00	.26	1.00	1.01
Constant	.01	<.00			.00	<.00		

Note. * Indicates statistical significance at the >.05 level.

7.3.4 EUE and weight loss success

The unadjusted logistic regression model exploring the relationship between EUE and weight loss success was not statistically significant ($\chi 2$ (1) = 1.13, p = .29). The model explained 2.28% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 77.33% of cases.

The adjusted logistic regression model including EUE and demographic covariates was not statistically significant ($\chi 2$ (5) = 10.05, p = .07). The model explained 19.08% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 77.33% of cases. Participants' EUE score, age, gender, age at first living with overweight, and the number of days since referred to the T3WMS were not associated with successful weight loss.

Table 7.6
Logistic regression exploring the relationship between EUE and likelihood of achieving 5% weight loss

	Unadjusted model				Adjusted model			
	Odds ratio	*p*	95% CI for OR		Odds ratio	*p*	95% CI for OR	
			LL	UL			LL	UL
EUE	1.37	.29	.77	2.46	1.71	.13	.86	3.41
Age (years)					1.06	.05	1.00	1.13
Gender (male)					.32	.21	.06	1.89
Age first overweight (years)					1.00	.97	.95	1.06
Number of days between first and last weight					1.002	.25	1.00	1.01
Constant	.14	.01			.00	.00		

7.3.5 SE and weight loss success

The unadjusted logistic regression model exploring the relationship between SE and successful weight loss was positive and statistically significant ($\chi 2$ (1) = 4.04, p = .04). This suggests higher scores on SE were associated with a greater likelihood of achieving 5% weight loss. The model explained 7.98% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 80.00% of cases.

The adjusted logistic regression model including SE and the demographic variables was also statistically significant ($\chi 2$ (5) = 11.96, p = .04). The model explained 22.43% (Nagelkerke R^2) of the variance in weight loss success and correctly classified 78.67% of cases. As shown in Table *7.7*, participants' SE score and age were statistically significantly related to weight loss success, such that higher scores on SE and older age were positively associated with achieving 5% weight loss. Analyses met the assumptions of linearity and multicollinearity.

Table 7.7
Logistic regression exploring the relationship between SE and likelihood of achieving 5% weight loss

	Unadjusted model				Adjusted model			
	Odds ratio	*p*	95% CI for OR		Odds ratio	*p*	95% CI for OR	
			LL	UL			LL	UL
SE	1.75	.05*	1.00	3.07	1.93	.04*	1.02	3.68
Age (years)					1.07	.04*	1.00	1.13
Gender (male)					.47	.42	.07	2.94
Age first overweight (years)					1.00	.91	.94	1.05
Number of days between first and last weight					1.00	.25	1.00	1.01
Constant	.06	.00			.00	.00		

Note. * Indicates statistical significance at the >.05 level.

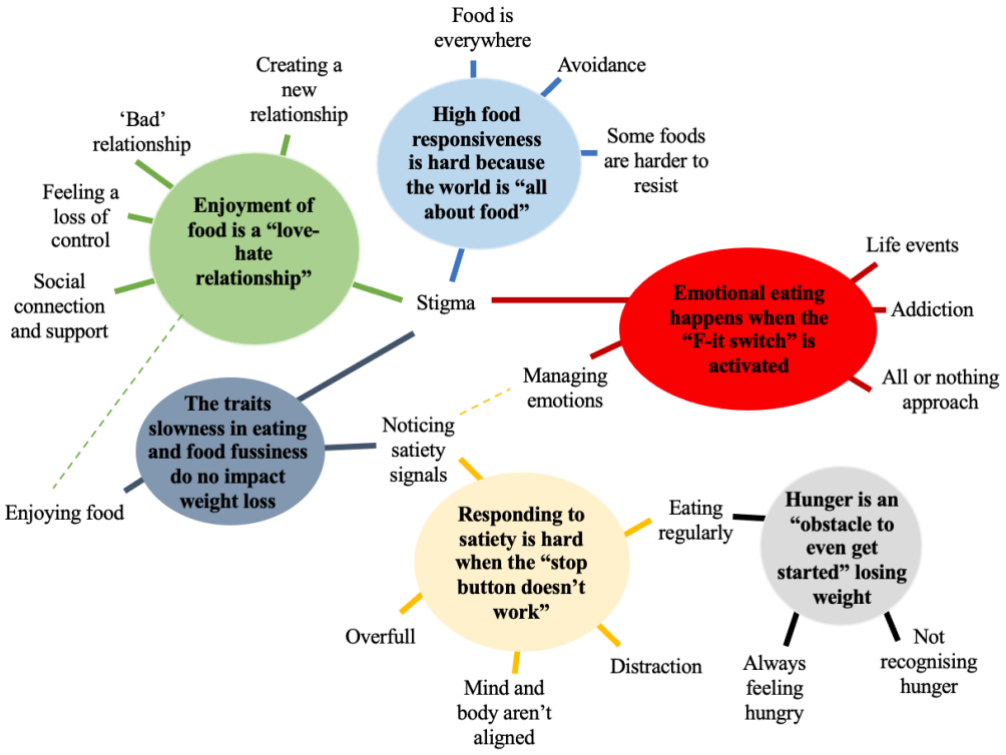
7.4 Question 3: participants' views of appetitive traits during weight management

As this thesis was focused on participants' views of appetitive traits during weight management, it was not possible to fully explore other factors which participants identified as impacting on their weight management. Themes from these factors included: personal factors which make losing weight harder (including mental and physical health, and exercise), systemic influences (such as cost of living and generational impacts) and having the right mindset; see Appendix H.

7.4.1 Thematic map

Following analysis, six themes were identified: 'enjoyment of food is a "love-hate relationship"', 'high food responsiveness is hard because the world is "all about food"', 'responding to satiety is hard when the "stop button doesn't work"', 'hunger is an "obstacle to even get started" losing weight, 'emotional eating happens when the "F-it switch" is activated', and 'the traits slowness in eating and food fussiness do not impact weight loss'. The thematic map, present below in Figure ***7.1*** depicts the themes, sub-themes, and how these related to one another.

Figure 7.1
Thematic Map



7.4.2 Enjoyment of food is a "love-hate relationship"

Participants consistently described a difficult relationship with their enjoyment of food, as it was "not black and white" (Emma). Participants expressed an enjoyment of food in relation to "taste" (Rowan), quality, satisfying textures and some enjoyed cooking. Those who described high EF experienced "a high when I'm eating" (Valerie). It followed that this enjoyment alleviated boredom for some participants and finding effective alternatives was described as difficult. Ali shared: "if you've nothing to do you do snack more". Being aware of this allowed for opportunities to change patterns, Mel shared: "after I've eaten dinner that's when my danger time has been and that's what I've been trying to kind of change my habit about." For most participants, enjoyment of food has been helpful at points in their lives. For example, Dave experienced several big life changes, including the loss of close relationships. He reflected that "it got to a point where that was my only enjoyment, for four years". However, this relied on individuals having awareness of patterns relating to EF.

Some participants described their enjoyment of food as all-consuming, resulting in feeling a loss of control around food. Emma shared an example of this: "at Easter, I ate 50 eggs. I mean, I'm not proud of it but I'd gone in and got the family eggs and I had to go in [to the supermarket] 5 times to actually get them because I just kept eating them […] I was so ashamed". This uncontrolled eating may achieve pleasant physical sensations of being full, or over-full. "I want that satisfaction and I get the fullness but then I carry on going then there's no, there's no stop […] it's hard to control your weight when there's, when there's no stopping" (Hannah). When participants felt a loss of control, they described feelings of guilt and disappointment; "I sort of regret it […] I never feel sort of proud of myself" (Caroline). Therefore, participants described wanting to have signals of when to stop eating while also enjoying food; "I still want food […] I just want to be able to better identify when is a good time to stop" (Chad).

Rowan shared their understanding of EF and weight management: "I think what's led me to put on this much weight [has been seeing food] as something for enjoyment and pleasure". Simply removing enjoyable foods from daily life was seen as a "radical" (Mel) and unstainable change. Some participants struggled to make sense of how EF linked to weight-management, for example, Ruth shared "I've got rows and rows of Slimming World books and healthy eating books but it's just I don't want it […] salad stuff, I could keep it in the fridge but I won't go eat the salad but I like it but I won't eat it because I just don't fancy it." For participants like Ruth, they were unsure how to experience enjoyment of food while trying to lose weight. Some interviewees described creating new boundaries with enjoyed food, "I'm

only going to have bread on a Saturday and Sunday because I know that if I eat it every day my weight just goes up" (Malia). Similarly, an alternative which involved creating a new relationship with food; prioritising enjoyment; "one of me targets is to enjoy the food that I'm eating" and to "not think of it as a diet, think of it as just, this is my life now, this is what I've got to do" (Alex). Balancing enjoyment and weight-management were consistently described as difficult for participants describing high EF, even when AEBQ scores did not reflect this perception.

The stigma surrounding living with overweight and obesity was described as impacting participants' enjoyment of food throughout their lives; "I walked through the school gates […] I automatically got the name fatty […] I remember going for an interview to work in a disabled children's home and she said "you are far too fat to work here"" (Malia). Participants described not wishing to eat in public due to judgement and discrimination, with expected comments like "look at her eating that, that big, fat git" (Zara). Participants described seeking an understanding of EF which was not enmeshed with messages from others who could be discriminatory and reductive; "they look at you and think, you're overweight, you're lazy, you're overweight, you know, you've got no self-respect" (Hayley). These messages led participants to feel that they should not enjoy food, and instead simply focus on weight, "If I eat food, nice food I'm always going to be fat" (Malia). "It's really funny, isn't it, I love to eat it, but I hate food. If truth were known, I hate it" (Alex).

Therefore, participants described hating food and wanting to remove it from their life: "if I could just, you know, have a tablet instead of food and everyone else would accept that" (Emma). Some participants described having low enjoyment of food although this often linked to a lack of connection with others, or a dislike of cooking. Although Gerri ate "because I have to, not because I love it", for her and others food was enjoyable when it involved social connection: "if I had somebody cook for me […] then that's nice". Participants talked about how food being a social event, and feeling supported by others was helpful. Therefore, while food in isolation was described negatively, aspects of food could be enjoyed. Support from family members, friends and professionals to manage weight was described as both helpful and unhelpful. Alex described her love for her sister's baking, and how the sister supported her managing EF: "she makes lots of things […] she'll cut it in half and it's just a tiny bit, just for the taste". Hayley highlighted the need for continued support after losing weight, as it can feel like "you're abandoned, there's no, there's no continuity and it's like well, she don't need us anymore, well actually this is the time I do need you more than ever".

7.4.3 High food responsiveness is hard because the world is "all about food"

Participants described varying degrees of FR. Some participants described low responsiveness and being "not fussed" (Hayley). However, most participants described high responsiveness, sometimes even when their scores on the questionnaire did not reflect this. For Emma, high FR had a significant impact on weight management "it's just this focus on food, I wish I could just stop thinking about it, to be honest and you know, never have to think about it again in my whole life but it's not going to be like that. It's the bane of my life". Rowan gave an example of visiting their parents and having a strong physiological response when a roast dinner was being cooked: "I will be like a lost dog sort of start salivating […] if I'm walking past, I'm seeing really attractive food then I'll be hungry".

Participants described how food was everywhere, both at home and in public, but that the context was important. In public having high FR was described as problematic: "if I go out for a walk and it's a track and there's no shops about, that's probably perfectly acceptable but if I went on a walk into town and there's shops everywhere, then I would be thinking about food because it's literally in your face […] even adverts on TV, they just seem to be all about food" (Emma). Interviewees spoke about managing the impacts of FR primarily through avoidance. For Zara this meant trying to "avoid going near [the] bakery section" but for Alex, he no longer goes "into those shops now". The stigma of living with overweight and obesity impacted on how Emma responded to shops selling enjoyable foods: "I wouldn't go in but I would probably if I was what I'd call a reasonable weight […] I wouldn't go in because I know I'm not meant to be in there".

At home, having high FR had its own challenges "if I'm in the office I know I've got that to eat and that's for my day, but when I'm at home you can wander into the kitchen and just get whatever you want" (Ruth). Vicki mirrored this and shared that if she was at home, "and there's something in the cupboard and I'll go in the, say go in the fridge to get some oat milk out to put in the drink and it's like oh, there's some cheese there, I could just do that" (Vicki). "I weren't managing anything in the house, if it were there [then] I wanted to eat it […] I wouldn't purposely go out and buy it, if it's not there I won't eat it" (Lucy). Participants also described finding that they had a greater responsiveness to specific foods; some foods are hard to resist. For Caroline, these foods were "bread and crisps" as she consistently found it difficult to "refuse" them. Similarly, Malia stated "bread is my danger food"; avoiding foods available at home was also difficult. Some participants responded by not buying certain foods, ensuring their avoidance. Gerri shared her understanding of her high FR and subsequent management: "I

know what's going to happen, that's why I try to restrict the amount of stuff I've got in which I know I will go snack on".

7.4.4 Responding to satiety is hard when the "stop button doesn't work"

While a few participants described having high satiety responsiveness, most described having low responsiveness. Participants consistently talked about two types of satiety (physical and psychological) and they reflected on how this meant that their minds and bodies did not always align, regardless of awareness of physical satiety signals. For example, while Ruth did not need to "eat loads to feel full" she continued to eat, and Valerie spoke of needing lots to feel full; "I always used to say that my stop button doesn't work".

Psychologically, participants spoke about cognitive rules of when to stop eating, and a psychological satiation. Participants talked about being children and household rules to clear their plates, and this rule continuing into adulthood. For Malia, this meant that even when she felt physically full, she would "struggle with it but I carry on eating." Some participants were able to recognise the rule as being unhelpful and challenge the rule, "it helped me from a psychological point of view to think, actually you know it's not a sin, or wrong, to leave food on your plate" (Logan). Emma shared "I think it's more psychologically I feel full, not particularly my stomach". Participants described managing the mismatch between their minds and bodies by deciding when they needed to stop eating based on the number of calories consumed, the guidance of food plans such as Diet Chef, and by having smaller portions. "I've actually physically gone out and bought a smaller plate and just filled that because then it's like kiddyology […] I've eaten all of everything that was on my plate but I know that it was actually smaller amount" (Malia). However, "it's quite hard when you first start to make those healthy choices and cut your portions down […] it [becomes] you know, quite hard to deal" (Rachel). This can mean that "the first couple of times I cut it down I were actually hungry, but over time now, that might be why I'm feeling fuller, it might be something to do with that" (Lucy).

Some participants spoke of eating until they felt strong sensations of physical fullness; eating until they became overfull. Hannah shared that she needed the strong feeling of satiety to stop eating, and that achieving this was a goal: "it's the fullness that I enjoy. [Feeling] like I can't move". However, interviewees shared that this can be a difficult balance to achieve: "I'd definitely eat until I'm full rather than till I'm nearly full and then, so I would eat and then think oh I'm full now and then ten minutes later I think oh God, I'm stuffed" (Caroline). Difficulty noticing satiety signals could also mean that interviewees ate until "the point I feel sick, I don't act on it but I notice the point where I just feel really sick and then the top of my stomach hurts" (Gerri). Some participants shared that eating at regular intervals helped them to feel satiated

sooner: “I’ve been on shakes through the day which means I’m getting both meals, I’m getting the calories that I need […] which is loads easier because I’m not going home and eating loads” (Hannah). Otherwise, some interviewees described believing that they needed to continue eating, even when experiencing satiety signals, to compensate for calories.

Some participants recognised that during the weight management programme they had become more satiety responsive but that they struggled to make sense of why. “At one time I could have just carried on eating […] now at this moment in time I’m beginning not to eat as much, I seem to fill up really quickly […] I were wondering what, how come I were feeling full because I never really, I never felt full before but now it gets, it gets difficult to finish it […] summat in my head sort of stops me, subconsciously” (Lucy). Gerri spoke about how engaging in a weight management course helped her to become aware of how she was less likely to feel satiated if distracted from eating “I sit at the table, I don’t watch TV, I don’t look at my phone. I sit down and take my time”.

Distraction was described as a key strategy for many participants who found that they needed a greater amount of food to feel full; “I take a lot to get full, or it takes a long time for me to notice that I’m full at least” (Chad). Participants commonly spoke of distraction strategies which occupied their minds, such as going for a walk, cleaning, and doing crafts. Rachel spoke about drinking “a pint of water before I had a meal and sort of give you a bit of a full feeling before you start”. Distraction was used as a means of waiting for physical signals of satiety, meaning that participants would distract themselves until they felt full, rather than eating until they felt full. “I could keep going and going and I just think, actually just stop, walk away, have a drink of water, give it 20 minutes and see if you’re full or not. And when I do that, I don’t need to go back and eat anymore” (Logan). Equally, being distracted meant that there was “there’s no time to think about food” (Sarah).

7.4.5 Hunger is an “obstacle to even get started” losing weight

Participants reported that their experience of hunger was complex; while some participants described feeling hungry often, others described rarely experiencing hunger. Gerri described feeling strong physical sensations of hunger which included feeling “irritable […] queasy and uncomfortable and it’s like my whole body starts aching. I know I can’t go to bed when I’m hungry because I won’t sleep.” When physical hunger was present, participants understandably reacted to this by eating. However, for some participants, hunger felt uncontrollable: “I feel like I’m constantly hungry but I know I can’t constantly eat because it’s no good for me” (Gerri). Alex added that he can experience physical sensations of hunger but think “I can’t be hungry, I’ve just had me tea”. “That hunger there it’s potentially the biggest

obstacle to even get started [managing weight]" (Valerie). Ali shared that he was able to lose weight when he received appetite-suppressing medications, which shaped his view that high hunger was solely a physical process for him: "I don't know if I'd still lose weight but I don't think I'd put it back on because I think your stomach shrinks and I think it's got to the point where I look at food now and even though I'm eating very, very little I sometimes leave food and it's been a massive drop in appetite".

Participants generally recognised the role of hunger in their weight management attempts. Malia shared this plainly: "when I'm on a diet, which was quite often, I was always hungry. When I wasn't on a diet I could go all day and not eat a thing". Lucy built on this experience, recognising that she was more likely to be "irritable" and "hungry" when dieting. "It's difficult because obviously when you're trying to lose weight you're not eating the amount of stuff that you're normally eating" (Rachel), which could lead to feeling hungry more often. Caroline believed that "the only way I'm going to lose weight is if I can control, find a way to control [the hunger]" (Caroline).

Participants described experiencing hunger in ways not captured by the AEBQ. For example, experiencing hunger psychologically. "it's unusual for me to experience the stomach rumbling […] someone suggested to me, you know, if you're experiencing hunger from the neck up rather than the neck down" (Rowan). "I feel like it's in me head a bit because I feel like I'm thinking about it, and then I am [hungry]. But if I don't think about it, I'm not" (Hannah).

Some participants spoke of rarely feeling hungry, for example Liz shared that she had "absolutely no appetite during the day". Chad believed he didn't "really have a sort of hunger trait" and recognised the need to eat based on how long it had been since he last ate, thinking "well it's been like a day". Some participants identified having a lack of routine and being busy as reasons they may be distraction from hunger sensations. Some participants described eating as laborious, resulting in participants "eating because you have to" (Emma) whereas others did not want to eat in the absence of hunger sensations: "even my doctor was telling me I have to eat small portions and often, but I am not, if I'm not hungry, I'm not eating" (Sarah). Alternatively, it may be that some participants did not recognise hunger sensations. Hayley resonated with this: "I don't recognise when I am hungry, that's that problem now".

The suggestion that some participants did not recognise hunger sensations was supported by accounts that when those who described not feeling hunger did begin to eat, they then felt extremely hungry. While not all participants linked experiences of hunger with weight management, Liz shared that when she did not eat throughout the day then ate at night she would feel very hungry and "eat all the things"; Liz ended up "eating more. I end up eating a lot

more actually because it's just like trying to get that energy back and the best way to get energy is [to] fuel yourself". Eating regularly also meant that she experienced hunger at "more appropriate times without it impacting too much" on daily life.

To combat high or low experiences of hunger during weight management, participants described eating at specific times or regular intervals, sometimes at the advice of T3WMS dieticians, this also aided satiety responsiveness. However, eating at specific times for some participants meant that they ate "whether I'm hungry or not" (Vicki). A few participants shared their understanding of hunger as solely physiological: "I've always thought that my need to eat has been very much physiologically driven, as in what my body's chemicals tell me I need" (Valerie). Therefore, there were beliefs that a physical intervention was needed to reduce hunger, for example through injections. However, this made understanding the role of traits difficult for Alex, who described his experience of hunger being "pretty good at the moment, it just gets a little bit hungry now and again, but that's because I'm on Saxenda, so I think it's working. Well, I don't know if it's working, I'm thinking it is, so, but it might be just me that's more determined now, I don't know".

7.4.6 Emotional eating happens when the "F-it switch" is activated

Participants talked about how eating food helped them to manage emotions, particularly in response to big life events. For example, changes in body weight when entering the care system as a child, the loss of family members, divorce, the COVID-lockdowns and caring for others. A few participants talked about eating less in response to strong emotions, for example Rachel who "lost a stone in two weeks maybe because I just couldn't eat" following the death of her brother. Caroline captured the link between big events including getting divorced, the death of her mothers, and being made redundant: "each time one of these happened I started sort of eating more and each time I put four stone on and never lost it". Hayley shared her experience of caring for her dad and not having enough time to cook separate meals. Instead, Hayley described eating the food her dad valued, even though it went against her weight management plan: "you just lose yourself, you just lose everything that you would normally have said".

Participants consistently demonstrated an understanding of how emotional overeating related to weight management, but they did not consistently understand why they engaged in overeating. Hayley shared her curiosity about her relationship between emotions and food: "I don't know why I overeat […] when you go on a diet nobody does that with you, nobody sits down and says, oh right, tell me why did you [overeat?]" Participants tended to understand the seeking of food as a way of seeking comfort in emotionally challenging times as it provided a

"quick satisfaction" (Ruth). That comfort could be nostalgic and relate to how family members provided food in times of distress, "you know what your mum cooked you" (Rachel). Food was seen as something reliable in life; "it was the only thing that I could control in my life was the food that I was eating, sounds quite sad" (Zara). For those living with chronic pain, food provided relief from distressing emotions; "sometimes you get a bit miserable when you suffer with pain, so I want to eat something nice, something that's a bit, I don't know, makes you feel a bit better" (Alex).

Several participants spoke about the role of addiction in their lives, and how this related to both food and illicit substances. Dave shared how his substance use suppressed feelings of hunger, "and then when it wears off you just glutton yourself […] I was eating a stupid amount of food, so my weight was still creeping up and up and up". Rowan described this as "I do have an addictive nature and I think because I've stopped, you know, drinking and using drugs I've been looking for something else to fill what, what's been described as the emotional hole in myself".

Experiencing strong emotions related to weight management in daily life, adverse events, and weight loss success. This resulted in an "all or nothing" approach (Rowan) approach to weight management; "when I was at the Slimming World and such like, I'd go and I'd, I would try really, really hard but if I didn't lose the weight I'd then go home and comfort eat." (Vicki). Strong emotions can activate a "F-it switch" (Rowan). This switch could also be activated when interviewees did not meet their longer-term weight-management goals. Vicki spoke of looking forward to a family holiday and having a weight-loss goal over six-months in preparation for this: "I said to myself right, you need to do something about it, I'm 3 weeks to go and […] I'm still where I was and it's not where I wanted to be. So it's, I'm kind of almost on the tipping point of going, I am really upset and I'm really depressed and I'm just going to eat whatever where I know I can't because I'm not going to fit in that seat on the plane". Comfort eating could lead to emotional overeating, resulting in negative self-perceptions, as discussed in relation to EF and stigma.

7.4.7 The traits slowness in eating and food fussiness do not impact weight loss

Participants shared their experiences of SE and FF having little impact on their weight management attempts, but that SE did relate to other appetitive traits. While some interviewees spoke of eating slowly throughout their lives, others reported intentional and unintentional changes in their speed of eating. A few participants spoke about how their speed of eating depended on their emotional state, and demands in daily life, such as needing to eat quickly to care for children. Some participants shared their awareness that they ate quickly and reflected

that this meant “you don’t give yourself a chance to feel full […] then you think oh I can have summat else” (Rachel), which may also relate to satiety responsiveness. Dave shared difficulties of achieving satiety due to speed of eating, and this leading to consuming a greater volume of food “it’s gone in three bites, so you’re sat there and you’re like, oh that didn’t do much, because once again I don’t feel full, so that’s why I go to getting a Big Mac and a cheeseburger, and just wolf them down”.

Some participants related eating quickly to childhood experiences of ensuring adequate amounts of food. For example, Emma shared her experience growing up in a family of six: “you probably ate it fast so nobody else would eat it”. Interviewees also spoke of eating quickly to ensure maximum enjoyment of food, particularly with hot food, as it became less appealing when cold. Similarly, Chad spoke of enjoying food more when he ate quickly “when I enjoy something I’ll want to eat more of it and I’ll eat it particularly fast and by the time it’s, too late I’ve realised oh my God, I’ve eaten so much of it and now I’m stuffed”. However, for Hayley, when food has no social connection linked to it, she described eating more quickly as “it’s not an occasion to sit down and eat on your own so it’s just […] maybe that’s why I eat so quick […] there’s no occasion with it, there’s no social interaction with it”. Together, these reasons for quick eating suggests that SE my relate to EF and SR.

When eating more slowly was established, this seemed to be a robust strategy for some participants as it can facilitate the enjoyment of food, as individuals could “savour it as I’m eating it” (Alex). Equally, eating more slowly could contribute to greater satiety: “I eat very slowly, I don’t eat as fast as before. So I feel fuller easier, so it’s small portions, I don’t put a big portion on my plate. If I’m finished my food, then that’s it, I’m done, I’m not going for seconds or anything like that. Sometimes I’m sitting alone at the table because everybody’s finished eating and I’m still chewing” (Sarah).

Again, stigma surrounding weight meant that some people actively slowed their eating to minimise judgements from others. However, eating more slowly was not an easy task: “I have to focus very hard to eat slowly […] when I eat slowly, I feel probably more satisfied at the end of it, you know, that kind of, like nicely full as opposed to indigestion, full type” (Rowan). As alluded to in previous themes, some participants identified eating more slowly as a strategy to manage high SE, EF and SR.

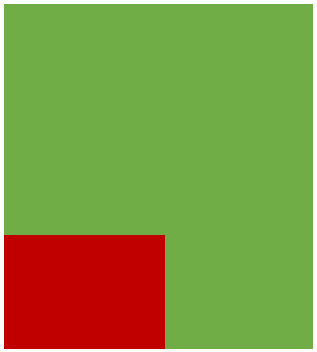
Most participants described not being fussy with food; their descriptions fitted with the trait EF; descriptions are not given here but the overlap between low FF and high EF and seeking new foods is noteworthy. A small number of participants described being fussy with food although no participants linked this with weight management success. Lucy shared that

she “didn’t touch a vegetable till I were 40, I wouldn’t eat them […] now I’ll eat vegetables”. Valerie recognised that being fussy may impact the range of foods she selected when dieting “if I were dieting in the sort of more traditional methods of diet, where people have salads and stuff like, there’s no way I’d eat salad, I don’t like it.”

7.5 Integration of findings

To triangulate the findings from each research question, and converge quantitative and qualitative data, all data were compared to detect areas of agreement and disagreement (Creswell, 2014; Creswell & Creswell, 2018). This process is depicted below.

Table 7.8
Integration of quantitative and qualitative data

Key finding	Quantitative data	Qualitative data	Comments
Question 1: what are the appetitive traits of people accessing T3WMS?			
People accessing the T3WMS had varied appetites			Participants had varied appetites, as reflected in the range of appetitive trait scores with broad distributions, as measured by the AEBQ. In the total sample and the pre-post sample, participants had higher scores for EF relative to other appetitive traits. In both samples EF was significantly skewed and interviewees spoke about food being an important source of enjoyment in their lives but feeling that they should not enjoy it.
Individuals' experience of hunger may not be reflected in the AEBQ			Quantitative data suggested that participants' H scores had a normal distribution, but without normative data it is not possible to comment whether scores were high or low relative to other populations. There was a range of H scores. Interviewees described hunger as complex and experiencing hunger in ways not captured by the AEBQ.
Question two: are appetitive traits related to success in the T3WMS?			
SR is related to weight loss success			Logistic regression indicated that being more satiety responsiveness was positively related to weight loss success. This was supported by interview data, as participants spoke about difficulties recognising signals of satiety, and two forms of satiety (physical and psychological).
Eating more slowly may reflect the successful management of other traits			Logistic regression indicated that a slower rate of eating was positively related to weight loss success. Interviewees described changing the speed of eating as a strategy to manage difficulties with enjoyment of food and satiety responsiveness.
FR may be related to weight management			Logistic regression indicated that FR scores were unrelated to weight loss success, but interviewees talked about difficulties managing high food responsiveness both at home and in public.

Key finding	Quantitative data	Qualitative data	Comments
Emotional eating may be related to weight loss success			Separate logistic regressions indicated that EOE and EUE scores were unrelated to weight loss success. However, interviewees spoke of emotional eating relating to weight loss success, as experiencing strong emotions could lead to an 'all or nothing approach'.
Food fussiness may not relate to weight management			Across the samples, the trait with the lowest score relative to other traits was FF. Interviewees spoke of FF having no impact on weight loss success, but instead talked about enjoyment derived from food.
Question 3: participants' views of appetitive traits during weight management			
Balancing enjoyment of food is key	N/A		Interviewees talked about having a love-hate relationship with food, feeling out of control around food, and wanting to form a new relationship with food which would facilitate weight loss.
Recognising appetite signals can be difficult	N/A		Interviewees spoke of struggling to recognise hunger and satiety signals.
Understanding the relationship between emotions and food approach traits can help	N/A		Interviewees spoke of wanting to understand possible relationships between their emotions and food approach, which could enable them to break repeating cycles and manage emotions in a new way.
Stigma impacts the expression and management of appetitive traits	N/A		Interviewees spoke of stigma influencing their experience and management of EF, FR, SE, H and emotional eating.

Note. Green = data supported key finding, orange = data neither agreed or disagreed with key finding, red = data disagreed with key finding, N/A = data does not relate to key finding.

8 Discussion

This is the first study to explore the appetitive traits of people accessing a U.K. T3WMS. The study is also the first to explore the relationship between AEBQ defined appetitive traits and weight loss success. Participants accessing the T3WMS had varied appetites, reflected in the range of appetitive trait scores with broad distributions, as measured by the AEBQ. Both quantitative and qualitative data suggested that the sample did not exclusively share an experience of one trait being particularly high. This may suggest that weight management is impacted by multiple traits, rather than one 'problematic' trait. Integration of quantitative and qualitative data suggested that the AEBQ measured appetitive traits do not always reflect an individuals' own experience of appetite in relation to weight loss. However, both quantitative and qualitative data suggested that having higher satiety responsiveness, and having a slower rate of eating were independently related to weight loss success. Qualitative findings suggested that the relationship between slowness in eating and weight loss success was indirect, as interviewees described eating slowly as a strategy to manage other appetitive traits such as EF, SR and emotional eating. Although quantitative data suggested that FR and emotional eating were unrelated to weight loss success, qualitative data suggested participants perceived these to be important. Additionally, participants highlighted that balancing enjoyment of food, and being able to recognise appetite signals were important during weight loss. Similarly, understanding one's appetite, and how emotions and experiences of stigma impacted appetite were considered important.

8.1 Question one: what are the appetitive traits of people accessing T3WMS?

8.1.1 People accessing the T3WMS had varied appetites

As normative data has not been created, it is not possible to comment on whether average trait scores were 'high' or 'low' at an individual level, or relative to other populations. However, it is noteworthy that each of the total sample's average trait score for each appetitive trait were similar to those of previous research; averages scores in previous research fell within one standard deviation of the average trait scores reported here (Cohen et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Murakami et al., 2022; Zickgraf & Rigby, 2019). Table ***7.2*** presented the mean and range scores for each of the AEBQ traits, and showed that for each of the eight traits, participants had a range of scores. In both the total and pre-post samples, participants had higher EF scores, and lower FF scores than may be expected based on a normal distribution. However, this may be reflective of the general

population having a high enjoyment of food, rather than a unique pattern of the population sampled here.

In this study, EF was the only trait to have an average score above four, an average comparable to the results of Zickgraf and Rigby (2019) who utilised a U.S. bariatric sample (M = 4.04 and M = 4.02 respectively). This fits with previous research which has consistently reported that EF had the highest average, relative to other traits in their samples (He, Sun, et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2019; Jacob et al., 2021; Mallan et al., 2017; Murakami et al., 2022; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019). Although those studies did not distinguish average trait scores based upon BMI category, Cohen et al. (2021) reported that EF was the trait with the highest score for both 'underweight'/ 'normal', and 'overweight'/ 'obese' samples.

It may be helpful to statistically compare the average trait scores of diverse weight samples to explore whether EF remains the highest scoring trait among different body weights and weight management status profiles (e.g., gaining weight, maintaining weight, losing weight). Such an analysis could also inform whether individuals accessing weight management services have significantly different trait scores compared to those who do not, and therefore inform individualised interventions. It was beyond the scope of this research to explore whether participants shared similar profiles of appetite. Considering the combination of an individual's trait scores and identifying patterns or profiles of appetite may be helpful; exploring appetitive patterns within a population may be achieved using latent profile analysis. Furthermore, it may be helpful to explore the relationships between diverse appetite profiles and weight loss success.

8.1.2 Individual experience of hunger may not be captured by the AEBQ

When considering the influence of individual appetitive traits, a contested trait has been hunger. Quantitative data here showed that H scores were normally distributed, and that within each sample, H had a standard deviation comparable to FR, EF and SR. H is intended to measure physical sensations of hunger (Hunot et al., 2016) but interviewees in this research described experiencing hunger as either physical or psychological, or a combination of both. This supports the notion that perception of hunger differs between individuals (He, Sun, et al., 2021; Wardle, 1987; Zickgraf & Rigby, 2019). Some interviewees shared that they rarely felt hungry but felt very hungry when they began to eat; this may suggest that some interviewees had difficulty recognising physical hunger cues. Whilst this finding is notable, the small number of participants means that this interpretation must be cautiously considered.

Findings here suggested that the AEBQ does not capture individual's experiences of hunger. This is supported by previous research which has challenged the inclusion of H in the

AEBQ and proposed that hunger may be classified as a state, rather than a trait (Harrold et al., 2012; Hunot et al., 2016). Debate continues as to whether a seven-factor AEBQ model with hunger removed may provide the best statistical fit (Cohen et al., 2021; Hunot-Alexander et al., 2021; Hunot-Alexander et al., 2019), and the findings of this research are supportive of an eight-factor model of the AEBQ is needed, as interviewees described this as an important aspect of their weight loss experience.

8.2 Question two: are appetitive traits related to success in the T3WMS?

8.2.1 SR is related to weight loss success

SR scores were positively related to weight loss success in both unadjusted and adjusted models. This suggests that individuals who were more satiety responsive were more likely to lose ≥5% of their body weight; a standard goal within weight loss interventions (Astrup & Pedersen, 2010; Brown et al., 2016; Magkos et al., 2016). While this finding must be cautiously interpreted as it is based on a small sample, it is supported by previous research which has reported a significant negative relationship between SR and BMI (Cohen et al., 2021; He, Sun, et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Mallan et al., 2017; Murakami et al., 2022; Shamsalinia et al., 2022).

When satiety responsiveness was explored during interviews, interviewees spoke of managing difficulty achieving satiety through several strategies such as distraction (to avoid feelings of being unsatiated), and serving smaller portion sizes which ensured lesser calorific intake and prevented eating beyond satiety to achieve plate-clearing. Robinson and Haynes (2021) reviewed three randomised controlled trials to evaluate the impact of reduced portion sizes on energy intake and reported that for most participants a smaller portion resulted in lesser energy intake. It is noteworthy that each of the three studies had a small sample size of less than fifty participants, and it is unclear whether participants were based in the U.K. or Australia. Robinson and Haynes (2021) also explored whether individual characteristics such as sex, BMI, restrained eating, disinhibited eating, and plate clearing tendencies influenced the relationship between portion size and energy intake. Their results indicated that individual characteristics did not reliably moderate the relationship between portion size and energy intake. Only one included study measured satiety responsiveness as measured by the AEBQ, meaning that the finding regarding satiety may not be generalisable. Reducing portion size could be an effective weight management strategy for most people, but it may be that reducing portion size is easier to implement for individuals with lower satiety responsiveness. This may explain the sub-group of participants, reported by Robinson and Haynes (2021), whose energy intake was deemed resistant to reduced portion sizes.

In this research, interviewees spoke of the differences between feeling physically and psychologically satiated, however the AEBQ only captures physical satiety. While utilising distraction strategies, having smaller portions and eating more slowly may be strategies to manage low physical satiety, it is unclear how these may impact psychological satiety. Some interviewees shared that when psychological satiety was not achieved, they continued to consume food and suddenly felt over-full; subsequently some interviewees described feeling guilt or disappointment as they had eaten more than intended. This may suggest that SR relates to emotion regulation and highlights a need to consider the relationships between appetitive traits. For example, SR has been reported to be positively associated with EUE (Hunot et al., 2016) and SE (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019), and negatively associated with FR (Cohen et al., 2021; Zickgraf & Rigby, 2019).

8.2.2 Eating more slowly may reflect the successful management of other traits

SE scores were significantly positively related to weight loss success in the unadjusted and the adjusted model, suggesting that people who ate more slowly were more likely to lose ≥5% of their body weight. This aligns with previous research which has reported significant negative relationships between SE and weight (Cohen et al., 2021; He, Sun, et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Murakami et al., 2022). It appears that the relationship between speed of eating and weight may be related to weight-management status. Hunot-Alexander et al. (2021) explored this relationship within a Mexican population and found that participants' speed of eating was negatively related to BMI, but only for participants who were not trying to lose weight. It may be that individuals become more aware of the speed at which they eat when trying to lose weight, or that they employ eating more slowly as a weight loss strategy.

Interviewees in this study spoke of how eating more slowly related to weight stigma, and managing traits such as EF, SR and FR (see Figure ***7.1***). This relationship between traits is supported by previous research, which has reported SE to be negatively associated with FR (Cohen et al., 2021) and EF (Mallan et al., 2017), and that SE is positively associated with SR (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019). Interviewee data here provided context that speed of eating may not reflect an innate appetitive trait for individuals accessing a T3WMS, but rather that eating more slowly was an effective weight-loss strategy. For example, interviewees described how eating more slowly facilitated a greater enjoyment of food, or that eating more slowly led to an increased awareness of satiety and cued them to stop eating. Eating more slowly may also reflect the

cognitive strategies used by individuals to manage weight, and these strategies may occur alongside other weight loss methods. Again, this highlights a need to consider an individual's overall appetite, rather than their individual traits, when considering weight management.

8.2.3 FR may be related to weight management

Quantitative data suggested that there was no significant relationship between FR and weight loss success. This finding contrasts with previous research which has reported a significant positive relationship between FR and BMI (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Murakami et al., 2022; Shamsalinia et al., 2022). It may be that the small sample size and low statistical power here contributed to a lack of significant findings. Alternatively, it may be that while FR is positively associated with BMI, it is unrelated to weight-loss, or unaffected by standard weight loss strategies and interventions. For example, interviewees who described having high food responsiveness shared that although they reduced portion sizes to lose weight, high food responsiveness meant that they would eat more often, and therefore still have a greater calorific intake than intended.

Interviewees spoke of how high food responsiveness made it more difficult to lose weight as food seemed to be everywhere (at home and in public), meaning that it was impossible to avoid food. Interviewees also spoke of some foods being harder to resist, and that when they could avoid such foods, they were able to lose weight. It is noteworthy that previous research has reported positive associations between FR and H (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019), which may suggest that when people have high food responsiveness and feel hungry often, they are likely to eat more than intended during weight loss attempts.

Interviewees spoke of how stigma impacted their management of high food responsiveness. For example, interviewees described noticing foods when in public places but choosing not to buy or consume the foods due to worries that others may be judgemental, and individual beliefs that they should not consume specific foods. Therefore, it appears that the stigma experienced by others became internalised, as individual's responses to food aligned more with the stigma of others, than in relation to their appetite. This internalised stigma may have been reflected here in interviewees descriptions of not being allowed to enjoy food, or feeling undeserving of the enjoyment derived from food. While this may lead to lesser consumption of food initially, interviewees described experiences like this eliciting distressing emotions, which interviewees managed through eating food in private. Therefore, stigma may reduce behaviours relating to food responsiveness, but experiencing the stigma surrounding weight and food choices then increased emotional eating. Understanding the relationship

between FR and emotional eating is important as previous research has reported significant positive associations between FR and EOE (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019). Data here suggests that managing weight stigma may exacerbate the connections between FR and EOE during weight loss attempts. While weight-management services cannot directly influence the social or food environments in which individuals live, they may offer individual strategies which compliment avoidance or address the impacts of stigma which impact on people's food responsiveness, self-view, and weight management goals.

8.2.4 Emotional eating may be related to weight loss success

Quantitative data suggested that there was no significant relationship between emotional eating (EUE and EOE) and weight loss success, but this lack of statistical significance may relate to the low number of participants and low statistical power. Previous research has reported associations between weight and emotional eating. For example, research has reported a significant negative relationship between EUE and BMI (Cohen et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Murakami et al., 2022; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019), and a significant positive relationship between EOE and BMI (Cohen et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Murakami et al., 2022; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019).

In this research, EOE had the highest standard deviation within each of the samples, and this may indicate that participants had more varied EOE scores, or that some participants had notably higher or lower EOE scores than others. It is noteworthy that across each sample, EUE had the lowest average score relative to other traits; this mirrors the result of Hunot et al. (2016) who utilised a sample with varied BMIs in the UK.

Although quantitative data here suggested that there was no significant relationship between emotional eating and weight loss success, interviewees spoke of difficulties achieving weight loss when they managed emotions by consuming food. For example, experiencing strong emotions could lead to an 'all or nothing' approach to weight management, and eating more food was linked with greater life stressors and events. As this research did not measure participants' life stressors during their involvement with the T3WMS, it was not possible to explore how life stressors, or emotion-management strategies, may impact on weight loss success. However, Shinde (2019) conducted an observational study in Southwest India to explore the relationship between BMI, AEBQ traits and job stress. They recruited 262 healthcare professionals from a tertiary hospital over a three-month period in 2018. Shinde (2019) reported no significant associations between BMI, AEBQ traits and job stress. The

research considered how participants' BMI category may have related to appetitive traits and jobs stress but did not consider whether participants in the study were actively trying to lose weight; this may account for the lack of significant finding.

Buckland et al. (2021) explored adults' susceptibility to energy dense food during the COVID lockdown; a time of increased stress at a population level. They recruited 485 participants from the U.K., and 103 participants from other countries experiencing similar lockdown conditions to the U.K., using online using social media, research recruitment websites and email distribution lists. They reported that greater EOE and FR scores were positively related to the amount of high energy dense sweet and savoury food eaten. Furthermore, the amount of food consumed was positively correlated with participants' BMI. This suggests that it is important to consider the impact and management of stressful life events during weight loss attempts, and that it may be helpful for weight management services to provide interventions focused on emotion regulation or stress management. However, it is noteworthy that the final number of participants who completed all relevant measures was below what the researchers had hoped and meant that the study may not have had sufficient statistical power.

Interviewees consistently talked about emotion regulation in relation and feeling a loss of control around food. He, Zickgraf, et al. (2021) found that uncontrolled eating significantly positively related to food approach traits, and negatively related to the avoidance traits SR and EUE. This suggests that individuals with higher food approach traits may be more likely to engage in uncontrolled eating. Individuals may engage in being eating behaviour, in which people experience a subjective loss of control while eating, and then consume an objectively higher quantity of food than most other people would in a similar situation (American Psychiatric Association, 2013). When binge eating episodes are recurrent, individuals may meet the diagnostic criteria for Binge Eating Disorder, which includes experiencing a loss of control while eating and consuming large amounts. Here, no interviewees reported receiving a diagnostic label relating to eating but several did describe past binge eating behaviours; this may indicate fulfilment of the diagnostic criteria for Binge Eating Disorder, but a thorough clinical assessment would be needed to determine this. While it may appear that the prevalence of disordered eating within a T3WMS is low, the small sample used here means that this conclusion cannot be drawn with any confidence. Previous research has suggested that the prevalence of eating disorders in the UK population is around 4.40%, and that the prevalence of Binge Eating Disorder is around 3.60% (Solmi et al., 2016). However, the prevalence of people with eating disorders has been shown to be higher among adults living with overweight and obesity (Da Luz et al., 2017; Duncan et al., 2017), meaning that it may be clinically important

for weight management services to consider loss of control among both clinical and non-clinical populations.

8.2.5 Food fussiness may not relate to weight management

Adults tend to have more control over the foods they choose to eat than children, but like children, their food choices may be influenced by food fussiness. Having high food fussiness indicates a tendency to be selective about the foods eaten, or a reluctance to try new foods. For example, an individual may exclusively prefer food of a particular texture or flavour profile. Few studies have reported a negative association between FF and BMI (He, Sun, et al., 2021; Mallan et al., 2017). Although some interviewees here spoke of having high food fussiness, and some interviewees described having low food fussiness, no interviewees related food fussiness to weight management. This is consistent with previous quantitative research which has reported no relationship between FF and weight (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Murakami et al., 2022; Zickgraf & Rigby, 2019).

Across the samples, the trait with the lowest score relative to other traits was FF. This is similar to previous research which has utilised participants with a variety of BMI categorisations, which have reported FF to have the lowest trait score (Cohen et al., 2021; He, Sun, et al., 2021; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019). It may be helpful for future research to conduct a direct statistical comparison of FF scores across published studies, whose samples include a variety of BMI's, ages and geographical locations to explore how FF differs across the general population.

The lack of direct relationship between FF and weight management may suggest that an alternative understanding of FF is needed. Being fussy with food has been associated with forms of unhealthy eating, and for some people this may lead to a higher body weight (Kauer et al., 2015). The shared aetiology between fussy eating and disordered eating is unknown (Herle et al., 2020). People who exhibit avoidant or restrictive food intake behaviours may experience weight loss, deficit nutrition, a dependence on supplements or psychosocial impairment meet the diagnostic criteria for avoidant/restrictive food intake disorder (ARFID; American Psychiatric Association, 2013). In a longitudinal population study of children's eating behaviours in the Southwest of England, Herle et al. (2020) reported that food fussiness was associated an increased risk of the eating disorder anorexia. Furthermore, studies which have utilised the CEBQ have demonstrated that FF is a higher among children living with autism spectrum condition (Kozak et al., 2023; Smith et al., 2020), and that this population have higher rates of difficulties with ARFID. Therefore, it may be helpful for future research to explore the relationship between FF, difficulties with eating, weight, and neurodiversity in adults.

8.3 Question 3: participants' views of appetitive traits during weight management

8.3.1 Balancing enjoyment of food is key

The relationship between EF and BMI is unclear, as research has reported both positive and negative associations between the two (see Table ***5.1***). Here, interviewees repeatedly spoke of the challenges of managing enjoyment of food in relation to weight loss. Interviewees spoke of difficulties in their relationship with food, and a sense of losing control around some foods. Participants described feeling that they could not simultaneously enjoy food and lose weight, and beliefs that they should not enjoy food. Some interviewees spoke of enjoying food as a goal during weight loss, rather than focusing on removing enjoyable aspects of food. Interviewees also spoke of the difficulties sustaining weight-loss attempts when also trying to form new relationships with food; those who established a new relationship found their new relationship with food helpful.

It is possible that the relationship between EF and weight changes as an individuals' weight management status also changes (e.g., maintaining weight versus losing weight). Table ***5.1*** summarises previous research using the eight-factor AEBQ and reported relationships between EF and BMI and shows that the relationship between EF and BMI is unclear. These inconsistent findings may be due to variations in participants' weight management status. Hunot-Alexander et al. (2021) explored the relationship between weight management status, BMI and appetitive traits, and found that EF had a significant positive relationship with BMI only for participants who were not trying to lose weight. Similarly, Zickgraf and Rigby (2019) reported no significant relationship between EF and BMI in their bariatric surgery sample. This suggests that it is important to consider how enjoyment of food changes during weight-loss attempts, and whether it is beneficial for weight-management services to offer interventions which focus on maintaining service users' enjoyment of food.

8.3.2 Recognising appetite signals can be difficult

Interviewees spoke of hunger and satiety having both physical and psychological aspects, and some interviewees experienced difficulties recognising internal cues for both hunger and satiety. Interviewees described struggling to achieve psychological satiety, and wishing for a sense of psychological satiety before they stopped eating. Quantitative data suggested that having higher satiety responsiveness was positively associated with weight loss. It was not possible to determine whether less satiety responsive participants recognised cues of satiety, or whether they recognised cues but did not respond. Here, interviewees described how eating at a slower pace gave them more time to recognise satiety signals and stop eating before feeling over-full, this suggests that eating more slowly increased recognition of satiety cues.

Yu et al. (2022) explored the relationship between sensitivity to internal cues of satiety and SR measured by the AEBQ. They asked participants to complete measures related to satiety, including the Reasons Individuals Stop Eating Questionnaire (RISE-Q-15; Chawner et al., 2022), the Multidimensional Assessment of Interoceptive Awareness (MAIA; Mehling et al., 2012), and the Intuitive Eating Scale (IES; Hawks et al., 2004). Yu et al. (2022) reported that there were significant correlations between RISE-Q-15 subscales and participants' BMI, and that there was a significant relationship between intuitive eating scores and SR scores. Therefore, these findings suggest that when people are aware of satiety signals, they are more likely to have a healthy BMI. Chawner et al. (2022) extended this research using online questionnaires to explore whether individuals with a BMI in the 'healthy' range may be more sensitive and responsive to internal satiety cues. They reported that participants' SR, as measured by the AEBQ, was positively associated with food having decreasing appeal, but was not associated with physical satisfaction. Therefore, the results of Chawner et al. (2022) indicated that the AEBQ may not capture individuals' physical satisfaction, but rather experiencing food as less appealing the more they eat. This is significant as interviewees here struggled to achieve physical and psychological satisfaction, which are not distinguished within the AEBQ.

Many interviewees spoke about the link between life stressors with body weight; both in terms of gaining and losing weight. It is possible that stressful experiences may impact an individuals' ability to recognise signals of hunger and satiety. Zickgraf and Rigby (2019) proposed that people who are more aware of, and responsive to, the physiological signals of hunger and satiety may be more likely to experience a loss of appetitive when stressed, as it is physiological signals that are impacted (e.g. Lutter & Nestler, 2009; Yau & Potenza, 2013). This aligns with the accounts of interviewees here who described rarely feeling physical sensations of hunger and noted current life stressors including high workloads, and a range of physical and mental health difficulties. However, interviewees also linked stressful life events with increases in weight, and interviewees spoke of engaging in more emotional eating at difficult times, contradicting Zickgraf and Rigby's proposal. It may be that as stressors increase, more importance is placed on a sense of psychological satiety, or that the signals which communicate psychological satiety are altered in some way.

8.3.3 Understanding the relationship between emotions and food approach can help

Participants described regulating emotions as an important factor in weight-management, with many participants describing an 'all or nothing' approach to weight-management. It is important to recognise the context of interviewees as individuals who have

repeatedly engaged weight-management attempts throughout their lives. Many interviewees described living with both physical and mental health conditions which negatively impacted on both their emotional regulation and weight management. The ability to engage in weight-management is proposed to be dependent on a limited psychological resource, which when used can result in the inability to self-regulate and 'ego depletion' (Baumeister et al., 2007; Muraven & Baumeister, 2000). Ego depletion is a psychological phenomenon in which an individual's initial level of self-control hinders later performance, meaning that while people engaging in tasks involving self-control may do well at first, their performance on tasks decreases over time (Baumeister et al., 2007; Muraven & Baumeister, 2000). The impacts of ego depletion have been reported in meta-analyses (Dang, 2018; Hagger et al., 2010), and research has suggested that tasks which elicit emotions result in the largest ego depletion (Dang, 2018). It may be helpful for individuals to understand this process when engaging in weight loss, particularly if they identify struggling with certain appetitive traits, and do not understand why.

8.3.4 Understanding traits and weight loss

The qualitative results here highlighted that it was important for interviewees to make sense of their difficulties with weight management. A few interviewees adopted a physiological understanding of weight and traits, and they described beliefs that physical interventions alone, such as appetitive suppressing injections and bariatric surgeries, could lead to significant reductions in their body weight. Some participants began to understand difficulties with weight-management as relating to appetitive traits, and these interviewees expressed a desire to increase their understanding of appetite, and for some this extended to understanding appetite and its relation to emotion regulation. Hunot-Alexander et al. (2021) explored the impact of a brief Appetitive trait Tailored Intervention (ATTI) based on participants AEBQ scores. The intervention was informed by Cognitive Behavioural Therapy and included information about their appetites and weekly 'tips' for weight management behaviours over eight-weeks. Engagement in the intervention lead to significant weight loss (>5% of baseline weight) for around a third of participants, which suggests that it was an effective weight loss intervention for some. Furthermore, interview data revealed that participants felt that the intervention increased their self-awareness, and that this helped to encourage behavioural changes.

In the present study, some interviewees were aware of changes in their appetitive traits such as feeling satiated more quickly, and while they were unsure why a change had occurred it was related to greater weight loss. Therefore, although individuals may not require an understanding of traits to achieve weight loss, weight management services require and understanding of traits and how to manage their impacts to deliver effective interventions. This

is highlighted by Cifuentes et al. (2023), who explored the effectiveness of individualised weight interventions for Americans with a BMI of over 30kg/m^2 based on phenotypes, compared to standard lifestyle interventions. The data of 81 participants was used to evaluate the standard lifestyle intervention, and the data of 84 participants was used to evaluate the impact of personalised interventions. Personalised interventions considered individuals' behavioural traits, which included satiety responsiveness and emotional eating. Participants with low satiation engaged in time-restricted eating or had protein supplements before meals to manage the impacts of low satiation. Over 12-weeks, the individuals who engaged in a personalised intervention lost more weight than those engaged in a standard intervention. This suggests that individualised interventions based on an individuals' appetite may lead to greater weight-loss, but randomised controlled trials are needed to explore this rigorously.

8.3.5 Stigma impacts the expression and management of appetitive traits

Qualitative data suggested that interviewees' experience of managing appetitive traits was impacted by stigma. As shown in Figure ***7.1***, stigma was described in relation to EF, FR, SE, H and emotional eating. Although no significant relationships were found between emotional eating and weight loss success in the quantitative analyses, it may be that experiences of stigma mediate their relationship (Robinson et al., 2020). For example, interviewees repeatedly described stigma impacting their enjoyment of food, meaning they often felt unjustified in enjoying food. This is supported by previous research which identified that social pressures can impede weight loss attempts, due to concerns about stigmatisation from others (Rogerson et al., 2016). It may be that an endorsement of food avoidance traits, or the denial of food approach traits, reflect greater social desirability in the quantitative and qualitative data.

The explanatory model by Robinson et al. (2020) which links self-perception and living with overweight and obesity proposes that weight stigma becomes internalised. Within Western cultures, people living with overweight and obesity are viewed to be lacking self-control and intellect in mainstream media (Puhl & Heuer, 2009). Therefore, it may be helpful for weight-management interventions to address internalised weight-stigma as part of a tailored approach to weight-management. Lillis et al. (2019) explored the impact of weight stigma on weight loss for 162 participants, aged 18-70 living in America. It is noteworthy that the study utilised an existing research sample who were engaged in a 24-month weight loss intervention, with assessments every six months to compare a standard weight management intervention against an acceptance-based behavioural intervention (Lillis et al., 2015; Lillis et al., 2016). Lillis et al. (2019) collected participants' anthropometrics, assessed weight stigma using the Weight Self-Stigma Questionnaire (WSSQ; Lillis et al., 2010), and participants' weight management

strategies using the Weight Control Strategies Scale (WCSS; Pinto et al., 2013). They found when participants used more weight loss strategies (including food choices, self-monitoring, physical activity, and psychological strategies), self-devaluation decreased, and participants had greater weight loss. This suggests that reducing internalised weight stigma may lead to greater weight loss success.

It may also be important to consider the attitudes of professionals providing weight management services, as health professionals have been shown to have negative implicit and explicit attitudes towards people living with overweight and obesity (Abbott et al., 2023; Jungnickel et al., 2022; Tomiyama et al., 2015). It may be helpful to explore the attitudes of staff within T3WMS as both self-stigma and stigmatisation are positively related to unhealthy behaviours (Zhu et al., 2022). Weight stigma may also account for why some interviewees' trait scores appeared to contrast with verbal accounts of their experiences managing traits. However, as no formal comparison of verbal descriptions and AEBQ scores was completed due to the small interview sample, it is not possible to reliably comment on the extent to which interviewees' verbal descriptions differed from their trait scores.

8.3.6 The relationship between appetite and weight loss may change with age

In the adjusted models for SR and SE, age was the only factor which significantly contributed to the model; gender, age at first overweight and the number of days between first and last weight measurement did not significantly contribute to the model. Few studies have explored the impact of age on the relationship between appetitive traits and weight. Two studies explored age in relation to BMI and reported age-related differences for FR only; neither study reported a significant contribution of age for SR or SE (Cohen et al., 2021; Jacob et al., 2021). In these studies, participants aged 18-35 were reported to have significantly higher FR scores than those 36 and over. In their validation of the AEBQ in a Mexican sample, Hunot-Alexander et al. (2021) included age as a continuous variable in their analysis of the relationship between appetitive traits and BMI, reporting that age had no significant contribution to the model. This difference in findings could suggest that the relationship between age and traits is not linear.

8.4 Strengths

The mixed method approach used here facilitated a greater understanding of the role of appetitive traits in weight-management. Mixed-methods approaches are time intensive (Creswell & Creswell, 2018) and the research team were conscious of increasing the workload of an already pressured T3WMS. Therefore, as the lead researcher with dedicated time for

research built into my job plan, I contributed the significant time needed to meaningfully conduct the mixed-methods project.

This research explored the perceptions and experiences of those living with obesity to increase understanding of weight-management. This created a deeper understanding of the relationships between appetitive traits and weight management success, which would not be possible to achieve through quantitative data alone, or by only exploring the views of T3WMS clinicians. An in-depth understanding of appetitive traits can inform individualised weight-management interventions, and training for the T3WMS workforce, contributing to effective services.

This research utilised the AEBQ, an internationally validated psychometric measure which captures multiple appetitive traits (Alruwaitaa et al., 2022; Cohen et al., 2021; He, Sun, et al., 2021; Hristova, 2018; Hunot et al., 2016; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Shamsalinia et al., 2022; Zickgraf & Rigby, 2019). The use of the AEBQ means that results here can be compared with other research utilising the AEBQ in different contexts and populations.

Similar to previous research, the majority of the study's sample was female (Cohen et al., 2021; Hunot-Alexander et al., 2021; Jacob et al., 2021; Mallan et al., 2017; Zickgraf & Rigby, 2019). The interview sample was diverse with interviewees describing being from a range of SES backgrounds, geographic areas, living with a range of physical and mental health conditions, and neurodiversity. A National Obesity Audit began in 2022 England, and while reports have not yet described the demographics of people accessing T3WMSs, this information would be helpful in the future to further understand the representativeness of the sample recruited to the present study (NHS Digital, 2023).

The challenges of working within a research team are not often written about in published research (Linabary et al., 2021). The research team comprised of a Trainee Clinical Psychologist (working academically and clinically), two academics, and one clinician. Here, iRTA was used and this form of analysis emphasises that the completed analysis is only one story, rather than the story from a dataset (Braun & Clarke, 2023). This variety of experience was helpful during qualitative analysis as we were able to draw from our respective personal and professional experiences, share thoughts and dilemmas, which facilitated a richer understanding of themes. During a meeting, we used a helpful metaphor; that theoretical understanding of traits was likened to elements, and clinically we try to understand molecules. Furthermore, this combination of experience facilitated a meaningful understanding of the

research findings to research and clinical environments; Appendix G provides examples of this in relation to the iRTA process.

8.5 Limitations

It is important to interpret the research findings in the context of the small sample size; for each of the three questions the participant samples were mostly female and educated to college level. Conducting the research within one NHS T3WMS ensured clinical relevance and may mean that findings are generalisable to other T3WMSs. However, organisational obstacles slowed the research design and participant recruitment. The T3WMS staff were invested in the research but low confidence and familiarity with research and organisational procedures delayed recruitment by three months. It is possible that recruitment rates were negatively impacted by the T3WMS being delivered remotely, and by service users feeling distant from the service, and by proxy, the research. To overcome this, it may have been helpful to have had pictures of the research team on the research materials, and to have used recruitment videos rather than using written information alone. An attempt was made to recruit participants from the community (see Appendix B) through mediums including social media, but no participants were recruited. Ideally, a collaborative approach to community recruitment would have been taken, by having conversations with community weight management organisations, weight management influencers, and groups before an ethical amendment was made, to ensure shared investment and interest in community recruitment. However, this was not possible given the time available for the research, as much had had been used establishing connections within the T3WMS.

The T3WMS provide services to a large geographical area with varying demographics and SES. When considering appetitive traits and weight-management, it may be important to consider SES and participants' local food environment, neither of which were controlled for in this research. Lin et al. (2021) used the AEBQ as part of their investigation of dietary quality for people awaiting bariatric surgery and found within this group, there was a mix of food availability, and individuals who did not have food security had a poorer quality diet. However, measuring food security and the quality of local food environments are complex, and inclusion of these may be best suited to long-term, large-scale, and multi-site research.

While this research measured appetitive traits, it did not utilise other measures relating to eating behaviours such as cognitive restraint and disinhibition; these behaviours can be measured using the TFEQ (Stunkard & Messick, 1985) and provide data about participants' rigid or flexible eating. Similarly, the DEBQ (Van Strien et al., 1986) measures restraint and external eating, and the measure may have been helpful here given that interviewees spoke of

difficulties with uncontrolled eating and rigid eating. Furthermore, had the research team had greater time and resource, it may have been possible to have measured satiety responsiveness by calculating participants' SQ, and paired with the AEBQ SR scale, this may have provided richer information on how participants' satiety responsiveness related to weight management.

T3WMS clinicians estimated that 75-80% of service users would consent to contact about the research. Due to the clinical demands of the T3WMS staff sharing the research with service users, it was not possible to collect service user contact data to determine what percentage of service users who were approached about the research provided consent to be contacted by the research team. T3WMS clinicians spoke of factors which meant that they did not share information about the research, and why some service users did not consent to be contacted. For example, service users: did not speak English well; did not have an email address; lived with a learning disability; had low confidence with technology; and, that service users felt overwhelmed with the number of questionnaires and appointments required within the T3WMS. These examples highlight that the research could have been more inclusive by recruiting by telephone, letter, and having translated versions of research materials to allow a greater number of people to take part. However, the financial costs and time associated with such changes were beyond the scope of this doctoral research.

In this research, it was not possible to differentiate whether weight was self-reported or measured by clinicians. Therefore, it was assumed that all weight data was self-reported and therefore may have been under-reported (Gorber et al., 2007; Wilson et al., 2019), possibly due to social desirability. This may have impacted quantitative analyses as data may not have reflected the reality of participants weight loss. Furthermore, the period between baseline and follow-up weight data was inconsistent. For example, for some participants there was a difference of one month between the two, and for a minority this was duration was over 18 months. Therefore, it is possible that a short period between the baseline and follow-up measure meant that participants were unlikely to achieve a >5% weight loss, limiting the likelihood of statistical significance in the logistic regressions.

It is noteworthy that the T3WMS was paused for ten months during the COVID-19 pandemic, resulting in a high number of service users on a waiting list and many short-term interventions were provided to ensure clinical targets were met; this may have impacted on participants' weight-loss success. The T3WMS clinicians reported to the research team that the service was commissioned for 250 referrals in the financial year 2022-2023, but that the number of referrals exceeded 600. During the data collection period, there were multiple staff changes and there were open vacancies; therefore, fewer service users were seen, and fewer participants

could be recruited. Furthermore, the service underwent structural changes which included the creation of three clinical pathways for service users, rather than only one pathway which was previously used. The combination of high referral numbers, changes in guidelines and less time to assess the outcome of the T3WMS interventions meant that participants received less monitoring and follow-up, and fewer psychological interventions.

During the recruitment period, the T3WMS began to provide Saxenda, a prescribed medicine administered through injection which aids weight-loss by suppressing appetite. In the total sample, five participants were noted to have obtained Saxenda privately and nine were prescribed Saxenda by the service. Given that Saxenda acts as an appetite suppressant, it may have been beneficial to control for the impact of Saxenda in the analysis but given the low number of participants, this was not possible.

Finally, it is noteworthy that this research was not pre-registered. While the benefits of pre-registering research include having greater clarity of analysis type, and more informative early data collection (Logg & Dorison, 2021), pre-registering studies can be costly and this research had a limited budget, all of which was used for transcription.. Furthermore, this project was time-limited, meaning that beginning recruitment as soon as possible was essential, and pre-registration may have delayed this process.

8.6 Theoretical, research and clinical implications

8.6.1 Theoretical implications

The behavioural susceptibility theory of obesity suggests that inherited appetitive traits predict an individual's likelihood of weight gain when in an obesogenic environment (Carnell et al., 2008; Carnell & Wardle, 2008). Data here suggests that a shift from a biological understanding of appetitive traits to a biopsychosocial theoretical understanding may be helpful. Interviewees spoke of how social factors and life events related to appetitive traits, but also to how psychological factors such as emotion regulation, experiences of trauma, and internalised stigma impact the management of appetitive traits (Robinson et al., 2020). At present, the behavioural susceptibility theory of obesity does not account for learning throughout an individual's life, or for the psychological and emotional responses to both food and living with overweight and obesity. Therefore, results here suggest that the behavioural susceptibility theory should have biopsychosocial underpinnings, and appetitive traits should also be considered in relation to individuals experiences, including those of weight stigma. Furthermore, while trait scores may reflect a person's biology and environment, at times scores may also reflect psychological and social processes. Psychological responses to stigma and other factors may account for why EF in children and babies has been consistently positively

associated with BMI (Kininmonth et al., 2021), but this has not been the case for adults (as demonstrated in Table ***5.1***). Furthermore, qualitative research exploring the experience of weight loss has highlighted that people experienced physical, social and psychological difficulties (Rogerson et al., 2016).

Robinson et al. (2020) proposed a model which accounts for the internalisation of weight stigma and the impact of this on weight management. Robinson et al. (2020) contest the use of behaviour change models in relation to weight management, as such models suggest that when individuals do not recognise that they live with excess weight, it is detrimental to their long-term health. However, research has indicated that having greater internalised weight stigma is linked with a greater body weight (Pearl et al., 2021), and suggests that a biopsychosocial understanding of appetitive traits and weight management may helpful. This is supported by the findings of Lillis et al. (2019) that engaging in less self-devaluation was associated with greater weight loss.

There has been debate about the inclusion of hunger in the AEBQ and data here supports the notion that perceptions of hunger differ between individuals (He, Sun, et al., 2021; Wardle, 1987; Zickgraf & Rigby, 2019). Therefore, it may be helpful to expand theoretical understandings of hunger, and the reasons why some individuals report experiencing few hunger cues, or low sensitivity to hunger cues. Similarly, theoretical understanding of satiety responsiveness may need to be expanded as interviewees here described both physical and psychological satiety, and previous research has suggested that the AEBQ measured SR scale may not capture physical satisfaction (Chawner et al., 2022).

8.6.2 Research implications

A biopsychosocial model of appetitive traits and weight may be established through qualitative research further exploring the experiences of people living with overweight and obesity in relation to appetitive traits and weight management. This may be achieved by using grounded theory to analyse interview data and create a model of relationships between traits and underlying social and cognitive processes (Bryant & Charmaz, 2007). Such a model may include weight stigma, and further research exploring the relationship between appetitive traits and stigma may inform theoretical models.

It may be helpful for future research to investigate the relationships between appetitive traits, age and stress. Experiencing stress is linked with metabolism changes and increased risk of excess body weight (Kivimäki et al., 2023), and the patterns of daily energy expenditure across the life-span are poorly studied (Pontzer et al., 2021). Therefore, future research should

also explore or control for participants' stress levels, as these may impact the relationship between appetitive traits and weight management (Buckland et al., 2021; Shinde, 2019).

At the time of writing, this is only the second research study to explore the appetitive traits of a population of individuals that exclusively live with obesity and the first of such with a U.K. based population accessing T3WMS. Zickgraf and Rigby (2019) previously explored the traits of a bariatric population in the U.S. Future research should continue to explore the appetitive traits of people with varied BMIs, and take the weight-management status of participants into consideration.

8.6.3 Clinical implications

Findings here suggest that it may be important to consider internalised weight stigma in individualised weight-management interventions. This may involve psychological exploration of the role of stigma and its influence on traits such as EF, FR and SE. Psychological interventions such as Acceptance and Commitment Therapy and Cognitive Behavioural Therapy have been shown to reduce internalised stigma (Pearl et al., 2020; Potts et al., 2022). In addition to individual level interventions, services could also tackle weight stigmatisation systemically. Brown et al. (2022) conducted a health policy review in the U.K. and recommended that healthcare leaders should focus on the wider determinants of health, beyond body weight alone. Furthermore, Brown et al. recommend that the narrative commonly used when discussing obesity is revised. It is noteworthy that the NHS Long Term Plan has been criticised for pessimistic and unpleasant references to obesity, which are likely to result in feeling of despair and anxiety for those living with obesity (Flint, 2020). Finally, healthcare policies should seek to focus on improving health behaviours, rather than reducing weight, to separate health and weight (Brown et al., 2022; Ramos Salas et al., 2017).

Results of this mixed-method research together with previous research suggest that identifying singular appetitive traits and their relationship to weight-loss success may be somewhat unhelpful, and it may be best to consider the relationships between an individuals' appetitive traits and their appetitive profile more broadly. Previous research has identified significant associations between traits such as FR and H, FR and EOE, and, FR and EF; and significant negative associations between EUE and EOE, and SE and SR (Cohen et al., 2021; Hunot et al., 2016; Jacob et al., 2021; Mallan et al., 2017). Understanding the appetitive traits profiles of service users together with service users' understanding of the links between their appetitive traits, can inform more individualised and effective interventions (Boutelle et al., 2020; Cifuentes et al., 2023). Interventions focused specifically on education about appetitive traits may also be beneficial (Hunot-Alexander et al., 2022).

Interviewees consistently identified feeling out of control in relation to EF as an obstacle to weight-management, along with emotion regulation. It may be beneficial for weight management services to provide interventions to support individuals to create a new, helpful relationship with food, emotion regulation psychoeducation and stress management. If individuals can adapt their immediate environments and meet underlying psychological needs in ways unrelated to food, the psychological tensions which hinder weight loss may be reduced (Greaves et al., 2017).

It is noteworthy that the feasibility of designing, delivering, and evaluating individualised weight management programmes within the NHS is low. As T3WMSs are designed and commissioned locally (Health and Social Act, 2012; Obesity Care Pathways, 2014) there are no standardised service specifications. Furthermore, although MDTS are utilised, the composition of MDTs varies between services, meaning that some disciplines may be under- or over-represented, impacting the types or number of specific interventions a service can deliver (Brown et al., 2017). Therefore, rigorously evaluating the impact of individualised programmes at a large scale is difficult, and therefore only small local evaluations are feasible.

8.7 Conclusion

Results must be interpreted cautiously given the small sample, but findings suggest individual variation in responsiveness to internal feelings of satiety, and a slower speed of eating may be determinants of weight loss success. Qualitative data supported these findings and suggested that emotion regulation, understanding of appetite and weight loss success, and findings ways to enjoy food are important during weight management. Importantly, the stigma surrounding living with overweight and obesity appears to impact both the understanding and expression of several traits, including FR, EF and SE.

9 References

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10 List of Abbreviations

AEBQ	Adult Eating Behaviour Questionnaire
BEBQ	Baby Eating Behaviour Questionnaire
BMI	Body Mass Index
BPS	British Psychological Society
CCG	Clinical Commissioning Group
CEBQ	Child Eating Behaviour Questionnaire
DEBQ	Dutch Eating Behaviour Questionnaire
EF	Enjoyment of Food
EOE	Emotional Over Eating
EUE	Emotional Under Eating
FF	Food Fussiness
FR	Food Responsiveness
H	Hunger
HSE	Health Survey England
IRAS	Integrated Research Applications System
iRTA	Interpretative Reflexive Thematic Analysis
MDT	Multidisciplinary Team
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
RTA	Reflexive Thematic Analysis
SE	Slowness in Eating
SES	Socioeconomic status
SR	Satiety Responsiveness
T3WMS	Tier Three Weight Management Service
TA	Thematic Analysis
THEW	Three-Factor Eating Questionnaire
U.K.	United Kingdom
U.S.A.	United States of America
WHO	World Health Organisation

Appendix A

Ethical approvals

A.1 Ethical Approval

Ymchwil Iechyd a Gofal Cymru
Health and Care Research Wales

NHS
Health Research Authority

Miss Stacey Boardman

Email: approvals@hra.nhs.uk
HCRW.approvals@wales.nhs.uk

14 February 2022

Dear Miss Boardman

HRA and Health and Care Research Wales (HCRW) Approval Letter

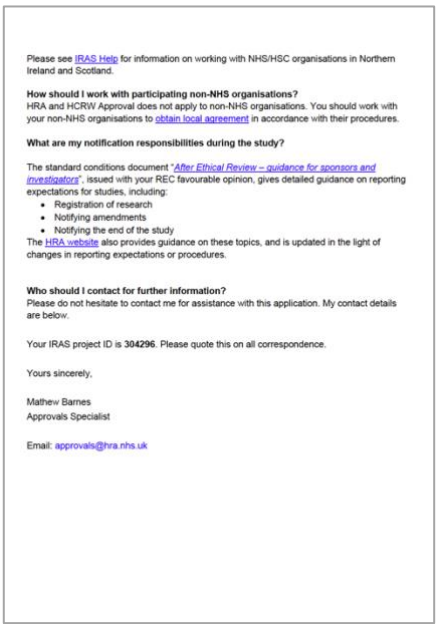
Study title:	**Do appetitive traits impact success in tier 3 weight management services?**
IRAS project ID:	**304296**
Protocol number:	**N/A**
REC reference:	**21/HRA/5464**
Sponsor	**The University of Leeds**

I am pleased to confirm that **HRA and Health and Care Research Wales (HCRW) Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications received. You should not expect to receive anything further relating to this application.

Please now work with participating NHS organisations to confirm capacity and capability, in line with the instructions provided in the "Information to support study set up" section towards the end of this letter.

How should I work with participating NHS/HSC organisations in Northern Ireland and Scotland?
HRA and HCRW Approval does not apply to NHS/HSC organisations within Northern Ireland and Scotland.

If you indicated in your IRAS form that you do have participating organisations in either of these devolved administrations, the final document set and the study wide governance report (including this letter) have been sent to the coordinating centre of each participating nation. The relevant national coordinating function/s will contact you as appropriate.



Please see IRAS Help for information on working with NHS/HSC organisations in Northern Ireland and Scotland.

How should I work with participating non-NHS organisations?
HRA and HCRW Approval does not apply to non-NHS organisations. You should work with your non-NHS organisations to obtain local agreement in accordance with their procedures.

What are my notification responsibilities during the study?

The standard conditions document "*After Ethical Review – guidance for sponsors and investigators*", issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

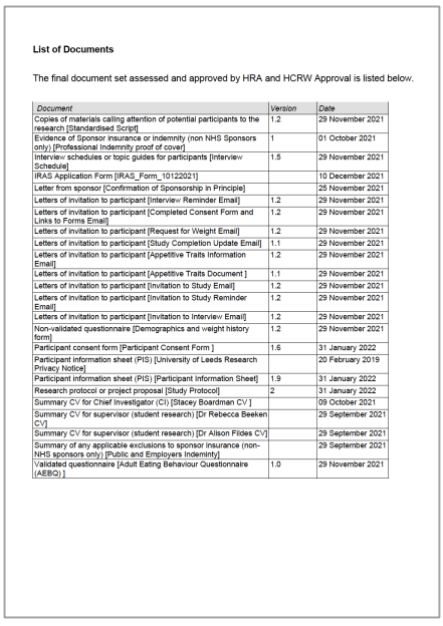
Who should I contact for further information?
Please do not hesitate to contact me for assistance with this application. My contact details are below.

Your IRAS project ID is **304296**. Please quote this on all correspondence.

Yours sincerely,

Mathew Barnes
Approvals Specialist

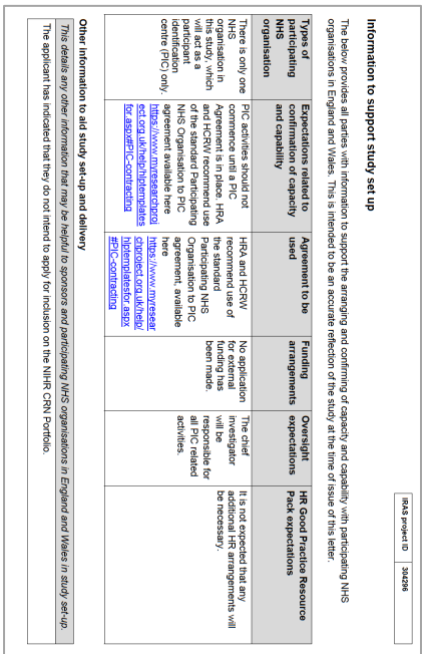
Email: approvals@hra.nhs.uk



List of Documents

The final document set assessed and approved by HRA and HCRW Approval is listed below.

Document	*Version*	*Date*
Copies of materials calling attention of potential participants to the research [Standardised Script]	1.2	29 November 2021
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Professional Indemnity proof of cover]	1	01 October 2021
Interview schedules or topic guides for participants [Interview Schedule]	1.5	29 November 2021
IRAS Application Form [IRAS_Form_10122021]		10 December 2021
Letter from sponsor [Confirmation of Sponsorship in Principle]		25 November 2021
Letters of invitation to participant [Interview Reminder Email]	1.2	29 November 2021
Letters of invitation to participant [Completed Consent Form and Links to Forms Email]	1.2	29 November 2021
Letters of invitation to participant [Request for Weight Email]	1.2	29 November 2021
Letters of invitation to participant [Study Completion Update Email]	1.1	29 November 2021
Letters of invitation to participant [Appetitive Traits Information Email]	1.2	29 November 2021
Letters of invitation to participant [Appetitive Traits Document]	1.1	29 November 2021
Letters of invitation to participant [Invitation to Study Email]	1.2	29 November 2021
Letters of invitation to participant [Invitation to Study Reminder Email]	1.2	29 November 2021
Letters of invitation to participant [Invitation to Interview Email]	1.2	29 November 2021
Non-validated questionnaire [Demographics and weight history form]	1.2	29 November 2021
Participant consent form [Participant Consent Form]	1.6	31 January 2022
Participant information sheet (PIS) [University of Leeds Research Privacy Notice]		20 February 2019
Participant information sheet (PIS) [Participant Information Sheet]	1.9	31 January 2022
Research protocol or project proposal [Study Protocol]	2	31 January 2022
Summary CV for Chief Investigator (CI) [Stacey Boardman CV]		09 October 2021
Summary CV for supervisor (student research) [Dr Rebecca Beeken CV]		29 September 2021
Summary CV for supervisor (student research) [Dr Alison Fildes CV]		29 September 2021
Summary of any applicable exclusions to sponsor insurance (non-NHS sponsors only) [Public and Employers Indemnity]		29 September 2021
Validated questionnaire [Adult Eating Behaviour Questionnaire (AEBQ)]	1.0	29 November 2021



Information to support study set up

The below provides all parties with information to support the arranging and confirming of capacity and capability with participating NHS organisations in England and Wales. This is intended to be an accurate reflection of the study at the time of issue of this letter.

IRAS project ID: 304296

Types of participating NHS organisation	Expectations related to confirmation of capacity and capability	Agreement to be used	Funding arrangements	Oversight expectations	HR Good Practice Resource Pack expectations
There is only one NHS organisation in this study, which will act as a participant identification centre (PIC) only.	PIC activities should not commence until a PIC Agreement is in place. HRA and HCRW recommend use of the standard Participating NHS Organisation to PIC agreement, available here https://www.myresearchproject.org.uk/Help/hptemplatesforPIC-contracting.aspx	HRA and HCRW recommend use of the standard Participating NHS Organisation to PIC agreement, available here https://www.myresearchproject.org.uk/Help/hptemplatesforPIC-contracting.aspx	No application to commercial funding has been made.	The chief investigator will be responsible for all PIC related activities.	It is not expected that any additional HR arrangements will be necessary.

Other information to aid study set-up and delivery

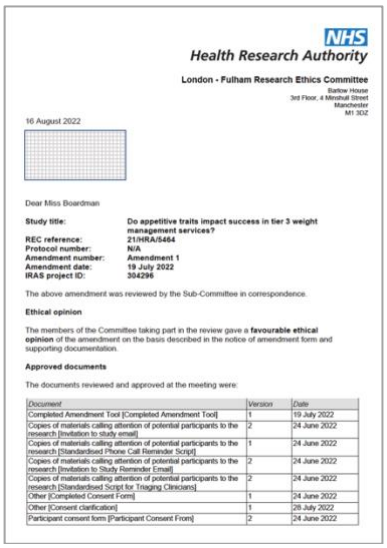
This details any other information that may be helpful to sponsors and participating NHS organisations in England and Wales in study set-up.

The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio.

A.2 Amendment one approval

Amendment to:

- allow participants to consent to the study online
- allow the researcher to call prospective participants to remind them about the research



NHS
Health Research Authority

London - Fulham Research Ethics Committee

Barlow House
3rd Floor, 4 Minshull Street
Manchester
M1 3DZ

16 August 2022

Dear Miss Boardman

Study title: **Do appetitive traits impact success in tier 3 weight management services?**
REC reference: **21/HRA/5464**
Protocol number: **N/A**
Amendment number: **Amendment 1**
Amendment date: **19 July 2022**
IRAS project ID: **304296**

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a **favourable ethical opinion** of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Completed Amendment Tool [Completed Amendment Tool]	1	19 July 2022
Copies of materials calling attention of potential participants to the research [Invitation to study email]	2	24 June 2022
Copies of materials calling attention of potential participants to the research [Standardised Phone Call Reminder Script]	1	24 June 2022
Copies of materials calling attention of potential participants to the research [Invitation to Study Reminder Email]	2	24 June 2022
Copies of materials calling attention of potential participants to the research [Standardised Script for Triaging Clinicians]	2	24 June 2022
Other [Completed Consent Form]	1	24 June 2022
Other [Consent clarification]	1	28 July 2022
Participant consent form [Participant Consent From]	2	24 June 2022

Participant information sheet (PIS) [Participant Information Sheet]	2	24 June 2022
Research protocol or project proposal [Study Protocol]	3	04 July 2022

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Amendments related to COVID-19

We will update your research summary for the above study on the research summaries section of our website. During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you have not already done so, please register your study on a public registry as soon as possible and provide the HRA with the registration detail, which will be posted alongside other information relating to your project.

Statement of compliance

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

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities - see details at: https://www.hra.nhs.uk/planning-and-improving-research/learning/

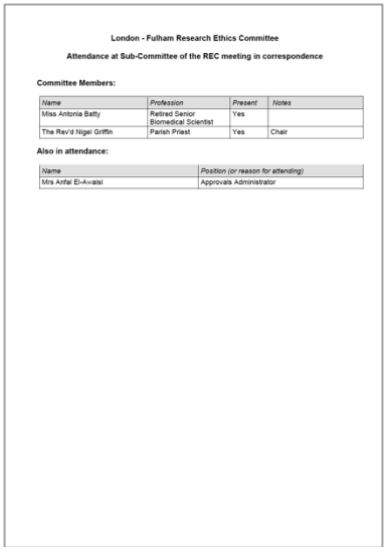
IRAS Project ID - 304296: **Please quote this number on all correspondence**

Yours sincerely

PP.
Anfal El-Avaisi

The Rev'd Nigel Griffin
Chair

E-mail: fulham.rec@hra.nhs.uk



London - Fulham Research Ethics Committee

Attendance at Sub-Committee of the REC meeting in correspondence

Committee Members:

Name	*Profession*	*Present*	*Notes*
Miss Antonia Batty	Retired Senior Biomedical Scientist	Yes	
The Rev'd Nigel Griffin	Parish Priest	Yes	Chair

Also in attendance:

Name	*Position (or reason for attending)*
Mrs Anfal El-Avaisi	Approvals Administrator

A.3 Amendment two approval

Amendment to:

- allow clinicians to recruit prospective participants from therapeutic groups
- send a service wide recruitment email to service users of the T3WMS

NHS
Health Research Authority

London - Fulham Research Ethics Committee

Barlow House
3rd Floor, 4 Minshull Street
Manchester
M1 3DZ

Please note: This is the favourable opinion of the REC only and does not allow the amendment to be implemented at NHS sites in England until the outcome of the HRA assessment has been confirmed.

22 September 2022

Miss Stacey Boardman

Dear Miss Boardman,

Study title: Do appetitive traits impact success in tier 3 weight management services?
REC reference: 21/HRA/5464
Protocol number: N/A
Amendment number: Amendment 2
Amendment date: 25 August 2022
IRAS project ID: 304296

The above amendment was reviewed by the Sub-Committee in correspondence.

Ethical opinion

The members of the Committee taking part in the review gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	Version	Date
Completed Amendment Tool [Amendment Tool]	1	25 August 2022
Copies of materials calling attention of potential participants to the research [Standardised Service Wide Recruitment email]	1	25 August 2022

A Research Ethics Committee established by the Health Research Authority

Non-validated questionnaire [Service Wide Demographics and Weight History Form]	1	25 August 2022
Other [Documents and Aims of Recruitment]	1	25 August 2022
Other [Example Completed Consent Form]	1	25 August 2022
Participant consent form [Service Wide Participant Consent Form]	1	25 August 2022
Participant information sheet (PIS) [Service Wide Participant Information Sheet]	1	25 August 2022
Research protocol or project proposal [Study Protocol]	4	25 August 2022

Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Amendments related to COVID-19

We will update your research summary for the above study on the research summaries section of our website. During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you have not already done so, please register your study on a public registry as soon as possible and provide the HRA with the registration detail, which will be posted alongside other information relating to your project.

Statement of compliance

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

HRA Learning

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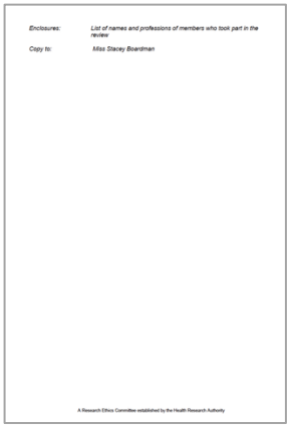
IRAS Project ID - 304296: Please quote this number on all correspondence

Yours sincerely
pp.

The Rev'd Nigel Griffin
Chair

E-mail: fulham.rec@hra.nhs.uk

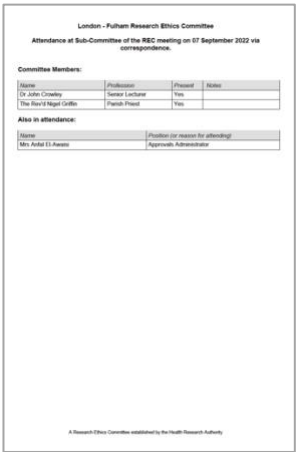
A Research Ethics Committee established by the Health Research Authority



Enclosures: *List of names and professions of members who took part in the review*

Copy to: *Miss Stacey Boardman*

A Research Ethics Committee established by the Health Research Authority



London - Fulham Research Ethics Committee

Attendance at Sub-Committee of the REC meeting on 07 September 2022 via correspondence.

Committee Members:

Name	Profession	Present	Notes
Dr John Crowley	Senior Lecturer	Yes	
The Rev'd Nigel Griffin	Parish Priest	Yes	

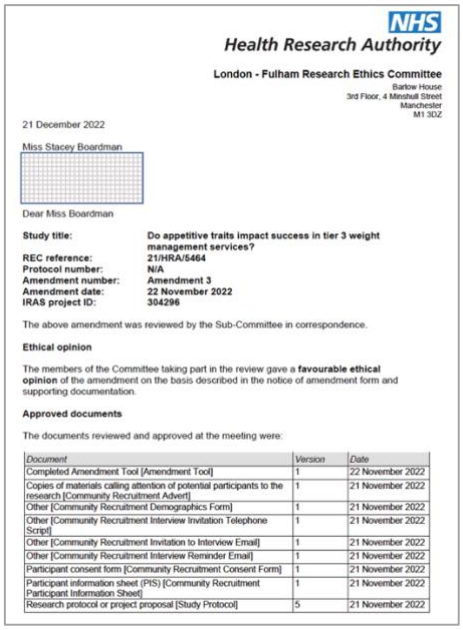
Also in attendance:

Name	Position (or reason for attending)
Mrs Anfal El-Awass	Approvals Administrator

A Research Ethics Committee established by the Health Research Authority

A.4 Amendment three approval

Amendment to recruit participants from the community.



NHS
Health Research Authority

London - Fulham Research Ethics Committee
Barlow House
3rd Floor, 4 Minshull Street
Manchester
M1 3DZ

21 December 2022

Miss Stacey Boardman

Dear Miss Boardman

Study title: **Do appetitive traits impact success in tier 3 weight management services?**
REC reference: **21/HRA/5464**
Protocol number: **N/A**
Amendment number: **Amendment 3**
Amendment date: **22 November 2022**
IRAS project ID: **304296**

The above amendment was reviewed by the Sub-Committee in correspondence.

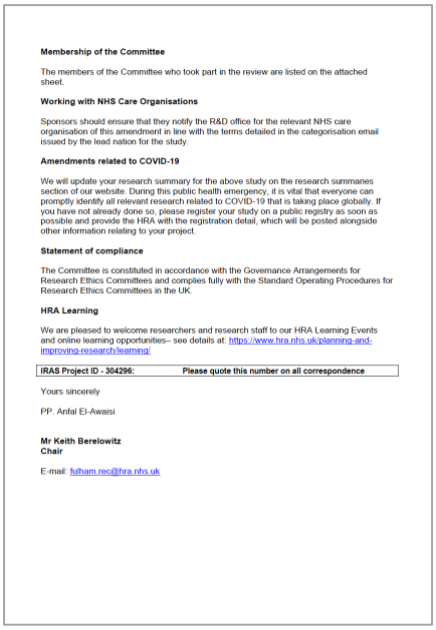
Ethical opinion

The members of the Committee taking part in the review gave a **favourable ethical opinion** of the amendment on the basis described in the notice of amendment form and supporting documentation.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Completed Amendment Tool [Amendment Tool]	1	22 November 2022
Copies of materials calling attention of potential participants to the research [Community Recruitment Advert]	1	21 November 2022
Other [Community Recruitment Demographics Form]	1	21 November 2022
Other [Community Recruitment Interview Invitation Telephone Script]	1	21 November 2022
Other [Community Recruitment Invitation to Interview Email]	1	21 November 2022
Other [Community Recruitment Interview Reminder Email]	1	21 November 2022
Participant consent form [Community Recruitment Consent Form]	1	21 November 2022
Participant information sheet (PIS) [Community Recruitment Participant Information Sheet]	1	21 November 2022
Research protocol or project proposal [Study Protocol]	5	21 November 2022



Membership of the Committee

The members of the Committee who took part in the review are listed on the attached sheet.

Working with NHS Care Organisations

Sponsors should ensure that they notify the R&D office for the relevant NHS care organisation of this amendment in line with the terms detailed in the categorisation email issued by the lead nation for the study.

Amendments related to COVID-19

We will update your research summary for the above study on the research summaries section of our website. During this public health emergency, it is vital that everyone can promptly identify all relevant research related to COVID-19 that is taking place globally. If you have not already done so, please register your study on a public registry as soon as possible and provide the HRA with the registration detail, which will be posted alongside other information relating to your project.

Statement of compliance

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

HRA Learning

We are pleased to welcome researchers and research staff to our HRA Learning Events and online learning opportunities– see details at: https://www.hra.nhs.uk/planning-and-improving-research/learning/

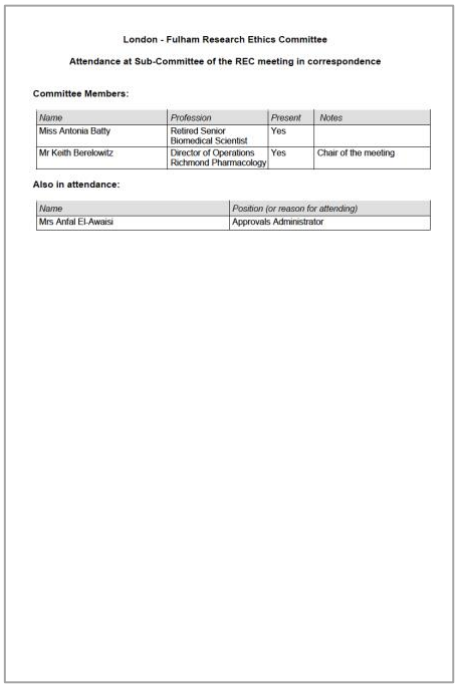
IRAS Project ID - 304296: **Please quote this number on all correspondence**

Yours sincerely

PP. Anfal El-Awaisi

Mr Keith Berelowitz
Chair

E-mail: fulham.rec@hra.nhs.uk



London - Fulham Research Ethics Committee

Attendance at Sub-Committee of the REC meeting in correspondence

Committee Members:

Name	*Profession*	*Present*	*Notes*
Miss Antonia Batty	Retired Senior Biomedical Scientist	Yes	
Mr Keith Berelowitz	Director of Operations Richmond Pharmacology	Yes	Chair of the meeting

Also in attendance:

Name	*Position (or reason for attending)*
Mrs Anfal El-Awaisi	Approvals Administrator

Appendix B

Community Recruitment

B.1 Effectiveness of community-based weight management programmes

Recruitment rates within the T3WMS were lower than anticipated, despite amendments to the recruitment process. To increase opportunities for participation in the research, recruitment was extended to the community; a matched community sample based on the T3WMS criteria was sought.

B.2 Inclusion criteria

Participants drawn from the community were required to meet the referral criteria for the Leeds Adult Specialist Weight Management Tier Three Service. These criteria were to be aged 18 or over and to have a BMI of at least 35 kg/m^2 at the start of their formal weight management programme. Participants were required to understand written and verbal English, and to have been taking part in a weight management programme (e.g. Slimming World, Weight Watchers) of twelve weeks or more, for at least four weeks, or to have completed a formal weight management programme lasting at least 12 weeks in the past 12 months.

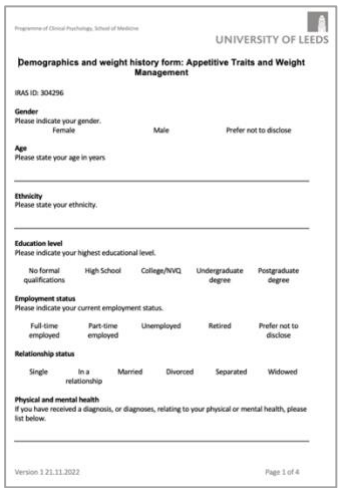
B.3 Exclusion criteria

Prospective participants who lived outside the U.K., who had previously had bariatric surgery or had existing bariatric procedures (such as gastric balloons), were excluded from the study as it is yet unclear how bariatric surgery may impact on appetitive traits (Gero et al., 2017).

B.4 Measures

B.4.1 Demographic, weight history, and weight

Weight, weight history, demographic and weight management programme information would have been collected in the Community Recruitment Demographics and Weight History Form (version 1, dated 21.11.2022), presented below. The form requested participants weight at the time the start of their engagement with a formal weight management programme and their weight at the end of the programme. Participants still engaged with a programme would have been asked for their current weight.



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Demographics and weight history form: Appetitive Traits and Weight Management

IRAS ID: 304296

Gender
Please indicate your gender.
Female Male Prefer not to disclose

Age
Please state your age in years

Ethnicity
Please state your ethnicity.

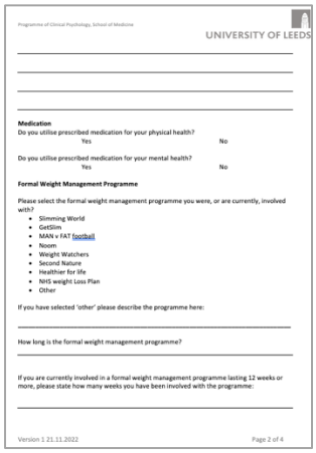
Education level
Please indicate your highest educational level.
No formal qualifications | High School | College/NVQ | Undergraduate degree | Postgraduate degree

Employment status
Please indicate your current employment status.
Full-time employed | Part-time employed | Unemployed | Retired | Prefer not to disclose

Relationship status
Single | In a relationship | Married | Divorced | Separated | Widowed

Physical and mental health
If you have received a diagnosis, or diagnoses, relating to your physical or mental health, please list below.

Version 1 21.11.2022 Page 1 of 4



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Medication
Do you utilise prescribed medication for your physical health?
Yes No

Do you utilise prescribed medication for your mental health?
Yes No

Formal Weight Management Programme

Please select the formal weight management programme you were, or are currently, involved with?

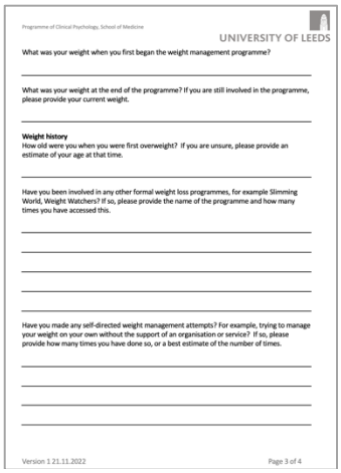
- Slimming World
- GetSlim
- MAN v FAT football
- Noom
- Weight Watchers
- Second Nature
- Healthier for life
- NHS weight Loss Plan
- Other

If you have selected 'other' please describe the programme here:

How long is the formal weight management programme?

If you are currently involved in a formal weight management programme lasting 12 weeks or more, please state how many weeks you have been involved with the programme:

Version 1 21.11.2022 Page 2 of 4



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What was your weight when you first began the weight management programme?

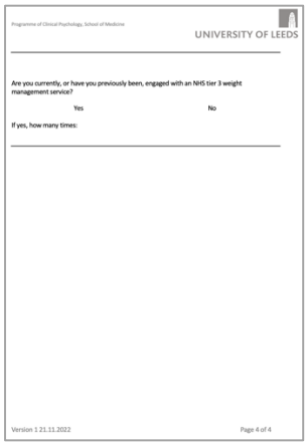
What was your weight at the end of the programme? If you are still involved in the programme, please provide your current weight.

Weight history
How old were you when you were first overweight? If you are unsure, please provide an estimate of your age at that time.

Have you been involved in any other formal weight loss programmes, for example Slimming World, Weight Watchers? If so, please provide the name of the programme and how many times you have accessed this.

Have you made any self-directed weight management attempts? For example, trying to manage your weight on your own without the support of an organisation or service? If so, please provide how many times you have done so, or a best estimate of the number of times.

Version 1 21.11.2022 Page 3 of 4



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Are you currently, or have you previously been, engaged with an NHS tier 3 weight management service?
Yes No

If yes, how many times:

Version 1 21.11.2022 Page 4 of 4

B.4.2 Adult Eating Behaviour questionnaire

Participants would have completed the AEBQ, see Appendix D.

B.5 Recruitment procedure

B.5.1 Participant identification and approach

A standard advert for prospective participants was disseminated through Facebook, Twitter, Instagram and Call For Participants; Community Recruitment Advert, version 1, dated 21.11.2022, shown below.

I messaged non-NHS organisations and groups to introduce herself, the research and ask if they would be comfortable sharing the advertisement. No individuals or organisations shared the advert. Examples of accounts contacted include the social media accounts of U.K. weight loss social media influencers (e.g. @trishas.transformation, @boothys_sw_insta19, @slimming.chris) and organisation pages including Weight Watchers, Slimming World, GetSlim, MAN V FAT, Second Nature, Noom, and Healthier for Life. The advert and a request to share was disseminated to Facebook groups such as "Weight Loss Support Group", "Weight Management Support Group", "Psychologist Working in Weight Management and Bariatrics", "Healthy Lifestyle & Weight Management", "WEIGHT MANAGEMENT", "Weight Loss Support Group, Tips & Tricks 2023", "myBMI – Weight Management Community & Support Group". One weight management group agreed to share the advertisement.

B.5.2 Informed consent and participant registration

The hyperlink and QR code in the advertisement directed prospective participants to a questionnaire on Jisc, an online questionnaire platform (formerly Bristol Online Surveys). Prospective participants would have been presented with the online Community Recruitment Participant Information Sheet (version 1, dated 21.11.2022), and once completed the research consent form (Community Recruitment Consent Form, version 1, dated 21.11.2022). These forms are presented below.

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Community Recruitment Participant Information Sheet: Appetitive Traits and Weight Management

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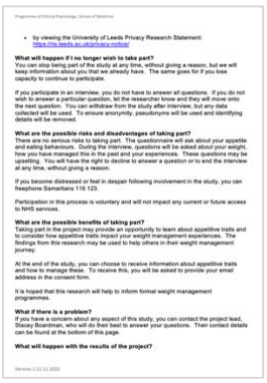
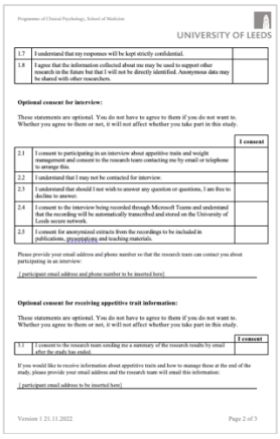




No participants were recruited to the research through this route. If participants had consented, after completing the consent form they would have been presented with the demographics and weight history form, then the AEBQ.

If participants had consented to the study and provided an email address, a copy of their consent form would have been sent by email (see Appendix E.12). It would not have been possible to provide a copy of the completed consent form if participants choose not to provide their email address; an email address and telephone number were requested for those interested in interview, for those interested in receiving information about appetitive traits at the end of the research, only and email address was requested.

It was hoped that some participants from the community may consent to interview about their views of appetitive traits during weight management. The procedure was amended so that interviews could be held, recorded and transcribed on Microsoft Teams. Participants would have received the Community Recruitment Invitation to Interview Email (version 1, dated 21.11.2022), and if interested and a suitable time and date was arranged, the Community Recruitment Interview Reminder Email (version 1, dated 21.11.2022); both are presented below.

Appetitive traits and weight management: Invitation to Interview Email

Dear [NAME],

Thank you for participating in the ongoing research, "Appetitive Traits and Weight Management" (IRAS ID: 304296). We would like to interview some people about their experiences to learn more about their views of appetitive traits and how these may influence their journey while engaged with in a weight management programme.

In your consent form you indicated that you would be interested in taking part in an interview. I am currently arranging times and dates to interview people who are still interested in taking part.

If you would like to participate in an interview, you will be sent a reminder email one week before. This reminder email will contain a link and ID to complete the 5-minute appetitive traits questionnaire before the interview; this is the same questionnaire you completed when you signed up for the study. Interviews will be held on Microsoft Teams – we will record the interview and use the transcription service on Teams. Interviews will last between 30 and 60 minutes and you can choose whether to have the cameras on or off.

We may use direct quotes from the interview in the study reports but we will not include your name and we will write these reports in a way that no-one can work out who gave the quote.

If interested, please could you respond to this email within 14 days. I may contact you by phone about taking part in an interview, as this may be easier than email for some people.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1 21.11.2022

Appetitive traits and weight management: Interview Reminder Email

Dear [NAME],

This email is a polite reminder that your upcoming interview, part of the "Appetitive Traits and Weight Management" study (IRAS ID: 304296), is scheduled soon. We have arranged to speak via Microsoft Teams on [DATE] at [TIME].

Ahead of this interview, please could you complete an online questionnaire using the unique code below. The questionnaire will take no more than five minutes to complete and is the same questionnaire you completed when you first joined the study.

Your unique ID is:
ID HERE

link to be inserted

The interview is estimated to last between 30 and 60 minutes. I look forward to speaking to you soon.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1 21.11.2022

B.5.3 Follow-up weight measures

All data would have been collected in the demographic and weight history form.

B.6 Data protection

All research data would have been pseudonymised and stored securely on encrypted devices and secured networks.

Appendix C

Demographic and weight history forms

C.1 Demographics and weight history form, version 1.2, dated 22.10.2021

Demographics and weight history form: Appetitive Traits and Weight Management

IRAS ID: 304296
Participant Identification Number:

Education level
Please indicate your highest educational level.

No formal qualifications | High School | College/NVQ | Undergraduate degree | Postgraduate degree

Relationship status

Single | In a relationship | Married | Divorced | Separated | Widowed

Physical and mental health
If you have received a diagnosis, or diagnoses, relating to your physical or mental health, please list below.

Medication
Do you utilise prescribed medication for your physical health?
Yes | No

Do you utilise prescribed medication for your mental health?
Yes | No

Weight history
How old were you when you were first overweight? If you are unsure, please provide an estimate of your age at that time.

Version 1.2 22.10.2021 Page 1 of 2

Have you engaged with this, or any other, NHS tier 3 service before?
Yes | No

If yes, how many times:

Have you been involved in any other formal weight loss programmes, for example Slimming World, One You Leeds? If so, please provide the name of the programme and how many times you have accessed this.

Have you made any self-directed weight management attempts? For example, trying to manage your weight on your own without the support of an organisation or service? If so, please provide how many times you have done so, or a best estimate of the number of times.

Version 1.2 22.10.2021 Page 2 of 2

C.2 Service wide demographics and weight history form, version 1.0, dated 25.08.2022

Demographics and weight history form: Appetitive Traits and Weight Management

IRAS ID: 304296

Gender
Please indicate your gender.
Female | Male | Prefer not to disclose

Age
Please state your age in years

Ethnicity
Please state your ethnicity.

Education level
Please indicate your highest educational level.

No formal qualifications | High School | College/NVQ | Undergraduate degree | Postgraduate degree

Employment status
Please indicate your current employment status.

Full-time employed | Part-time employed | Unemployed | Retired | Prefer not to disclose

Relationship status

Single | In a relationship | Married | Divorced | Separated | Widowed

Physical and mental health
If you have received a diagnosis, or diagnoses, relating to your physical or mental health, please list below.

Version 1.25.08.2022 Page 1 of 3

Medication
Do you utilise prescribed medication for your physical health?
Yes | No

Do you utilise prescribed medication for your mental health?
Yes | No

Weight history
How old were you when you were first overweight? If you are unsure, please provide an estimate of your age at that time.

Have you engaged with this, or any other, NHS tier 3 service before?
Yes | No

If yes, how many times:

Have you been involved in any other formal weight loss programmes, for example Slimming World, One You Leeds? If so, please provide the name of the programme and how many times you have accessed this.

Version 1.25.08.2022 Page 2 of 3

Have you made any self-directed weight management attempts? For example, trying to manage your weight on your own without the support of an organisation or service? If so, please provide how many times you have done so, or a best estimate of the number of times.

How long have you been open to the tier 3 weight management service? Please provide your answer in months.

What interventions have you received as part of the tier 3 weight management service?

What was your weight when you were first open to the tier 3 weight management service?

What is your current weight?

Version 1.25.08.2022 Page 3 of 3

C.3 Request for weight email, version 1.2, dated 29.11.2022

Appetitive traits and weight management: Request for Weight Email

Dear [NAME],

Thank you for participating in the ongoing research, "Appetitive Traits and Weight Management" (IRAS ID: 304296). At the start of the study, you were sent a Participant Information Sheet which outlined that we would collect your weight from your medical records every six months from the time you started the study and, that if we were unable to find this, we would email to request this information.

Unfortunately, we were unable to find a recent weight measurement in your file. Please could you send your current weight to our study inbox?
bhl.appetitivetraitsresearch@nhs.net

We will not share this with your weight management team.

Thank you for your continued participation in the study, we really value this and hope the results from this study will contribute to the development of weight management services in the future.

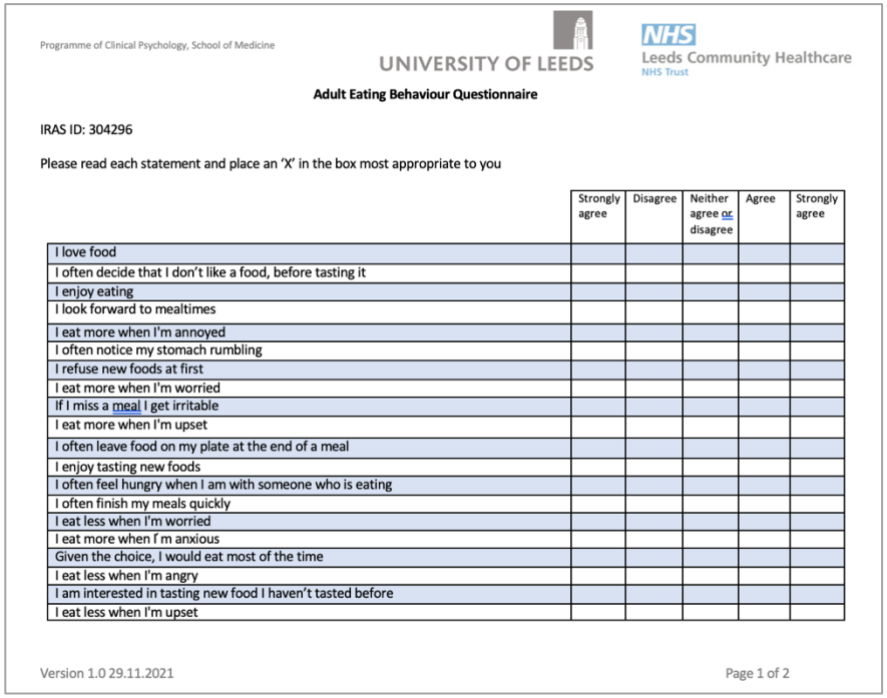
All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1.2 29.11.2021

Appendix D

Adult Eating Behaviour Questionnaire



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NHS Leeds Community Healthcare NHS Trust

Adult Eating Behaviour Questionnaire

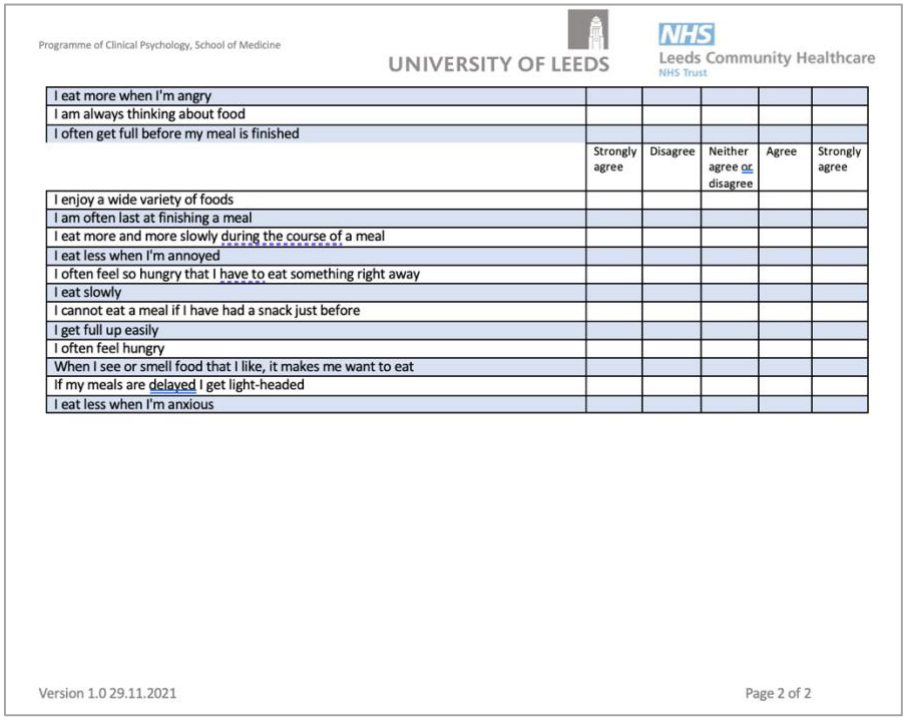
IRAS ID: 304296

Please read each statement and place an 'X' in the box most appropriate to you

	Strongly agree	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					
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					

Version 1.0 29.11.2021

Page 1 of 2



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	Strongly agree	Disagree	Neither agree or disagree	Agree	Strongly agree
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					

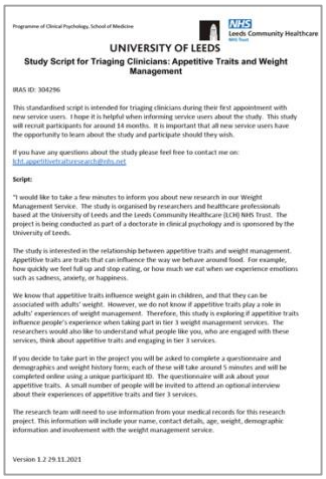
Version 1.0 29.11.2021

Page 2 of 2

Appendix E

Recruitment materials

E.1 Standardised script, version 1.2, dated 29.11.2021



Programme of Clinical Psychology, School of Medicine

NHS Leeds Community Healthcare NHS Trust

UNIVERSITY OF LEEDS

Study Script for Triaging Clinicians: Appetitive Traits and Weight Management

IRAS ID: 304296

This standardised script is intended for triaging clinicians during their first appointment with new service users. I hope it is helpful when informing service users about the study. This study will recruit participants for around 14 months. It is important that all new service users have the opportunity to learn about the study and participate should they wish.

If you have any questions about the study please feel free to contact me on:
lcht.appetitivetraitsresearch@nhs.net

Script:

"I would like to take a few minutes to inform you about new research in our Weight Management Service. The study is organised by researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds.

The study is interested in the relationship between appetitive traits and weight management. Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. The researchers would also like to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

If you decide to take part in the project you will be asked to complete a questionnaire and demographics and weight history form; each of these will take around 5 minutes and will be completed online using a unique participant ID. The questionnaire will ask about your appetitive traits. A small number of people will be invited to attend an optional interview about their experiences of appetitive traits and tier 3 services.

The research team will need to use information from your medical records for this research project. This information will include your name, contact details, age, weight, demographic information and involvement with the weight management service.

Version 1.2 29.11.2021

Programme of Clinical Psychology, School of Medicine

NHS Leeds Community Healthcare NHS Trust

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The research team want to include people who are engaged with this service, but who have NOT had bariatric surgery. If you have had bariatric surgery in the past, you will not be eligible to take part. As the study involves completing questionnaires in English, participants need to be able to understand both verbal and written English.

If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information the researchers have an email address you can contact them on. Are you interested in this study?"

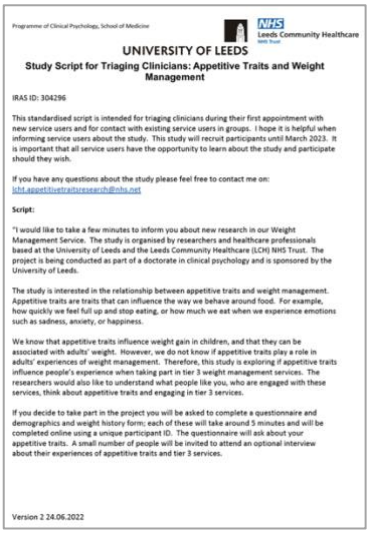
If interested:
"Thank you for your interest in this study. To put you in contact with the research team, please can we have consent to pass on your name, email address and NHS number to the research team? They will be in contact shortly."

If not interested:
"Thank you for taking the time to learn about this study."

If service users are interested and provide verbal consent for their contact details to be passed on, please email the person's name, email address and NHS number to the study inbox:
lcht.appetitivetraitsresearch@nhs.net

Version 1.2 29.11.2021

E.2 Standardised script, version 2, dated 24.06.2022



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Study Script for Triaging Clinicians: Appetitive Traits and Weight Management

IRAS ID: 304296

This standardised script is intended for triaging clinicians during their first appointment with new service users and for contact with existing service users in groups. I hope it is helpful when informing service users about the study. This study will recruit participants until March 2023. It is important that all service users have the opportunity to learn about the study and participate should they wish.

If you have any questions about the study please feel free to contact me on:
lcht.appetitivetraitsresearch@nhs.net

Script:

"I would like to take a few minutes to inform you about new research in our Weight Management Service. The study is organised by researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds.

The study is interested in the relationship between appetitive traits and weight management. Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. The researchers would also like to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

If you decide to take part in the project you will be asked to complete a questionnaire and demographics and weight history form; each of these will take around 5 minutes and will be completed online using a unique participant ID. The questionnaire will ask about your appetitive traits. A small number of people will be invited to attend an optional interview about their experiences of appetitive traits and tier 3 services.

Version 2 24.06.2022

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The research team will need to use information from your medical records for this research project. This information will include your name, contact details, age, weight, demographic information and involvement with the weight management service.

The research team want to include people who are engaged with this service, but who have NOT had bariatric surgery or bariatric procedures such as gastric balloons. If you have had bariatric procedures in the past, you will not be eligible to take part. As the study involves completing questionnaires in English, participants need to be able to understand both verbal and written English.

If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information the researchers have an email address you can contact them on. Are you interested in this study?"

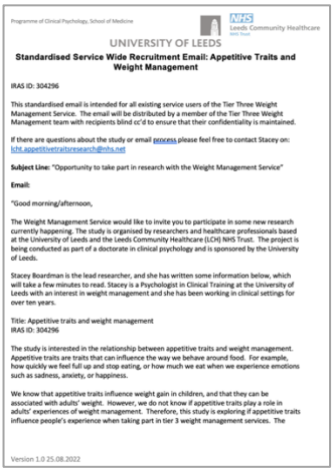
If interested:
"Thank you for your interest in this study. To put you in contact with the research team, please can we have consent to pass on your name, email address, phone number and NHS number to the research team? They will be in contact shortly."

If not interested:
"Thank you for taking the time to learn about this study."

If service users are interested and provide verbal consent for their contact details to be passed on, please email the person's name, email address, phone number, time open to the service, and NHS number to the study inbox:
lcht.appetitivetraitsresearch@nhs.net

Version 2 24.06.2022

E.3 Standardised Service Wide Recruitment Email, version 1.0, dated 25.08.2022



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Standardised Service Wide Recruitment Email: Appetitive Traits and Weight Management

IRAS ID: 304296

This standardised email is intended for all existing service users of the Tier Three Weight Management Service. The email will be distributed by a member of the Tier Three Weight Management team with recipients blind cc'd to ensure that their confidentiality is maintained.

If there are questions about the study or email process please feel free to contact Stacey on: lcht.appetitivetraitsresearch@nhs.net

Subject Line: "Opportunity to take part in research with the Weight Management Service"

Email:

"Good morning/afternoon,

The Weight Management Service would like to invite you to participate in some new research currently happening. The study is organised by researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds.

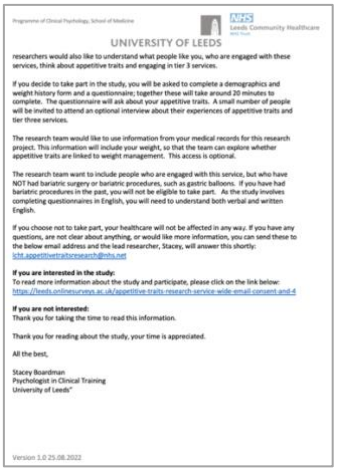
Stacey Boardman is the lead researcher, and she has written some information below, which will take a few minutes to read. Stacey is a Psychologist in Clinical Training at the University of Leeds with an interest in weight management and she has been working in clinical settings for over ten years.

Title: Appetitive traits and weight management
IRAS ID: 304296

The study is interested in the relationship between appetitive traits and weight management. Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. The

Version 1.0 25.08.2022



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researchers would also like to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

If you decide to take part in the study, you will be asked to complete a demographics and weight history form and a questionnaire; together these will take around 20 minutes to complete. The questionnaire will ask about your appetitive traits. A small number of people will be invited to attend an optional interview about their experiences of appetitive traits and tier three services.

The research team would like to use information from your medical records for this research project. This information will include your weight, so that the team can explore whether appetitive traits are linked to weight management. This access is optional.

The research team want to include people who are engaged with this service, but who have NOT had bariatric surgery or bariatric procedures, such as gastric balloons. If you have had bariatric procedures in the past, you will not be eligible to take part. As the study involves completing questionnaires in English, you will need to understand both verbal and written English.

If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information, you can send these to the below email address and the lead researcher, Stacey, will answer this shortly:
lcht.appetitivetraitsresearch@nhs.net

If you are interested in the study:
To read more information about the study and participate, please click on the link below:
https://leeds.onlinesurveys.ac.uk/appetitive-traits-research-service-wide-email-consent-and-4

If you are not interested:
Thank you for taking the time to read this information.

Thank you for reading about the study, your time is appreciated.

All the best,

Stacey Boardman
Psychologist in Clinical Training
University of Leeds"

Version 1.0 25.08.2022

E.4 Invitation to Study Email, version 1.2, dated 29.11.2021

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Appetitive traits and weight management: Invitation to Study Email

Dear [NAME],

My name is Stacey and I am conducting research within the Leeds Community Healthcare Weight Management Service. The study will explore "Appetitive Traits and Weight Management" (IRAS ID: 304296). This research is sponsored by the University of Leeds.

I am aware that you recently had your first appointment with the service and the clinician you met with mentioned our research. As you gave consent for your contact details to be passed on to the research team, I am writing to give you some more information.

I have attached an information sheet (version 1.8, dated 29/11/2021) which has more information about the study. If you have any questions about this or would like to discuss the research further, please feel free to email me on this address:
lcht.appetitivetraitsresearch@nhs.net

If you would like to take part in the study please complete the attached consent form (version 1.5, dated 29/11/2021) and return to this email address. You have four weeks from the date of this email to join the study if you wish to. I am aware that you may be very busy, so if I do not hear from you, I will send a reminder email in two weeks. You can also email me to tell me that you do not want to take part in this research, in which case I will not contact you again.

For your reference, I have also included a copy of the University of Leeds Research Privacy Notice.

Participation in this research is voluntary and will have no impact upon the care you receive.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1.2 29.11.2021

E.5 Participant Information Sheet, version 1.9, dated 31.01.2022

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Participant Information Sheet: Appetitive Traits and Weight Management

You are being invited to take part in a research project. Before you decide whether you would like to take part, you need to understand why the project is being done and what it will involve for you. Please take time to read the following information carefully. Take your time to decide whether to take part, and talk about it with family or friends if you wish. If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information, please contact us using the contact details at the end of this form.

Purpose of the project
Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness. Individuals may be either high, low, or somewhere in between on these different traits. This is thought to be because these traits are influenced, at least in part, by our genetics.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. We also want to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

Why have I been invited?
You are invited to join this project as you are engaged with the tier 3 weight management service. We want to include people who are engaged with this service, but who have NOT had bariatric surgery. If you have had bariatric surgery in the past, you will not be eligible to take part.

Who is organising this project?
This project is organised by researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds. Here, 'we' refers to the sponsor of the study and not LCH.

This study has been reviewed and approved by a Research Ethics Committee. All research in the NHS is reviewed by a Research Ethics committee. The Fulham NHS ethics committee reviewed this study on 14/02/2022 and confirmed the study can go ahead. IRAS ID: 304296

Who designed the project?
The project has been designed by researchers at the University of Leeds with an interest in appetite and weight management. An expert by experience consulted on

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aspects of the research design and materials, including the questions we will ask during interviews. The expert by experience has lived experience of managing their weight and living with obesity.

Do I have to take part?
No. Participation in this study is entirely voluntary. If you do not wish to take part your healthcare will not be affected in any way. If you choose to take part, you have the right to withdraw at any time, without giving a reason.

If you would like to take part, you will be provided with a copy of this information sheet to keep and asked to sign a consent form. You can still withdraw at any time without giving a reason.

What will happen to me if I decide to take part?
If you decide to take part in the project you will be asked to complete a questionnaire and demographics and weight history form; each of these will take around 5 minutes and will be completed online using a unique participant ID. The questionnaire will ask about your appetitive traits.

The project team will request access to your medical file to follow your journey with the tier 3 weight management service. Demographic information such as your age, gender, ethnicity and employment status will be collected from your medical records, along with any previous engagement with weight management services, intervention(s) received as part of the tier 3 service and any changes in your weight. The research team will collect measurements of your weight at six months intervals from your medical file. The lead researcher, Stacey Boardman, will access your medical file to obtain the information. If this information is not available in your medical file, the team will contact you by email to ask for this.

You will also have the option to take part in an interview. We would like to interview some people about their experiences to learn about their views of appetitive traits and how these may influence their journey while engaged with tier 3 weight management services. A small number of people who consent to interview will be contacted and invited to take part; a time and day convenient for you will be arranged. You will be asked to complete the 5-minute appetitive traits questionnaire again before interview. Interviews will be held on the telephone and will be recorded on a secure Dictaphone; interviews will last between 30 and 60 minutes. We may use direct quotes from the interview in the study reports, but we will write these reports in a way that no-one can work out who gave the quote.

We hope to follow people's experience with the tier 3 weight management service, from the time their engagement with the service begins until they complete treatment, usually around 12 months. However, the project will end on 3rd March 2023, which may be before your engagement with the service is complete. If are interested in knowing the results of the study, a summary will be emailed to you later in 2023.

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How will the data be stored?
We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

Everyone involved in this study will keep your data safe and secure. We will also follow all privacy rules. Consent forms, information from medical files, and information gathered from the demographics and weight history form and appetitive traits questionnaire will be stored securely on LCH trust networks. Only members of the project team will have access to this.

If you consent to an interview, this will be audio recorded on a secure device and stored securely on University of Leeds networks. Recordings will be transcribed by a person approved by the University of Leeds, and the audio files deleted. Transcripts will anonymise all identifying and confidential information and will be stored securely.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study. Transcripts and anonymised study data will be kept for five years on University of Leeds Networks, in accordance with University of Leeds guidelines; this may be used in future research. All other data will be deleted.

Will my taking part in the study be kept confidential?
We will need to use information from you and your medical records for this research project. This information will include your name, contact details, age, weight, demographic information and involvement with the weight management service. People will use this information to do the research. People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead. We will keep all information about you safe and secure.

All information collected during the project will be kept strictly confidential. Any information which may identify you will be anonymised. Your name will not be used, instead a unique identification number will be assigned and only the project team will have access to this. Interview transcripts will be stored on university secure drives and networks.

There are some limits to confidentiality and times when we are required to pass on information. If during the interview you were to disclose an intention to harm yourself or others, then the research team would need to inform those providing your care for safety reasons.

You can find out more about how we use your information
- at www.hra.nhs.uk/information-about-patients/
- by asking one of the research team
- by sending an email to lcht.appetitivetraitsresearch@nhs.net

What will happen if I no longer wish to take part?

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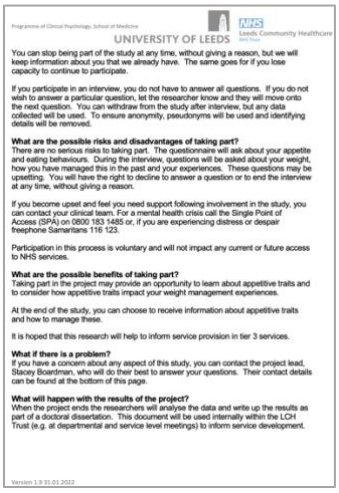

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You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have. The same goes for if you lose capacity to continue to participate.

If you participate in an interview, you do not have to answer all questions. If you do not wish to answer a particular question, let the researcher know and they will move onto the next question. You can withdraw from the study after interview, but any data collected will be used. To ensure anonymity, pseudonyms will be used and identifying details will be removed.

What are the possible risks and disadvantages of taking part?
There are no serious risks to taking part. The questionnaire will ask about your appetite and eating behaviours. During the interview, questions will be asked about your weight, how you have managed this in the past and your experiences. These questions may be upsetting. You will have the right to decline to answer a question or to end the interview at any time, without giving a reason.

If you become upset and feel you need support following involvement in the study, you can contact your clinical team. For a mental health crisis call the Single Point of Access (SPA) on 0800 183 1485 or, if you are experiencing distress or despair freephone Samaritans 116 123.

Participation in this process is voluntary and will not impact any current or future access to NHS services.

What are the possible benefits of taking part?
Taking part in the project may provide an opportunity to learn about appetitive traits and to consider how appetitive traits impact your weight management experiences.

At the end of the study, you can choose to receive information about appetitive traits and how to manage these.

It is hoped that this research will help to inform service provision in tier 3 services.

What if there is a problem?
If you have a concern about any aspect of this study, you can contact the project lead, Stacey Boardman, who will do their best to answer your questions. Their contact details can be found at the bottom of this page.

What will happen with the results of the project?
When the project ends the researchers will analyse the data and write up the results as part of a doctoral dissertation. This document will be used internally within the LCH Trust (e.g. at departmental and service level meetings) to inform service development.

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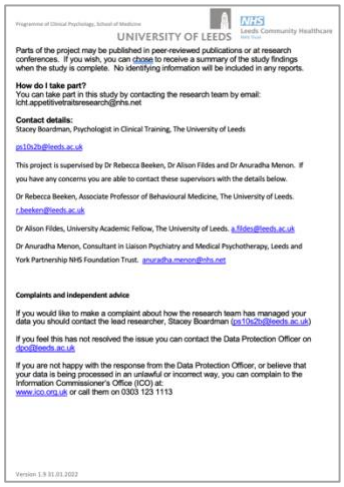

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Parts of the project may be published in peer-reviewed publications or at research conferences. If you wish, you can chose to receive a summary of the study findings when the study is complete. No identifying information will be included in any reports.

How do I take part?
You can take part in this study by contacting the research team by email:
lcht.appetitivetraitsresearch@nhs.net

Contact details:
Stacey Boardman, Psychologist in Clinical Training, The University of Leeds

gs10s2b@leeds.ac.uk

This project is supervised by Dr Rebecca Beeken, Dr Alison Fildes and Dr Anuradha Menon. If you have any concerns you are able to contact these supervisors with the details below.

Dr Rebecca Beeken, Associate Professor of Behavioural Medicine, The University of Leeds.
r.beeken@leeds.ac.uk

Dr Alison Fildes, University Academic Fellow, The University of Leeds. a.fildes@leeds.ac.uk

Dr Anuradha Menon, Consultant in Liaison Psychiatry and Medical Psychotherapy, Leeds and York Partnership NHS Foundation Trust. anuradha.menon@nhs.net

Complaints and independent advice

If you would like to make a complaint about how the research team has managed your data you should contact the lead researcher, Stacey Boardman (gs10s2b@leeds.ac.uk)

If you feel this has not resolved the issue you can contact the Data Protection Officer on dpo@leeds.ac.uk

If you are not happy with the response from the Data Protection Officer, or believe that your data is being processed in an unlawful or incorrect way, you can complain to the Information Commissioner's Office (ICO) at:
www.ico.org.uk or call them on 0303 123 1113

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E.6 University of Leeds Research Privacy Notice

RESEARCH PARTICIPANT PRIVACY NOTICE

Purpose of this Notice

This Notice explains how and why the University uses personal data for research; what individual rights are afforded under the Data Protection Act 2018 (DPA) and who to contact with any queries or concerns.

All research projects are different. This information is intended to supplement the specific information you will have been provided with when asked to participate in one of our research projects. The project specific information will provide details on how and why we will process your personal data, who will have access to it, any automated decision-making that affects you and for how long we will retain your personal data.

Why do we process personal data?

As a publically funded organisation we undertake scientific research which is in the public interest. The DPA requires us to have a legal basis for this processing: we rely upon "the performance of a task carried out in the public interest" as our lawful basis for processing personal data, and on "archiving in the public interest, scientific or historical research purposes, or statistical purposes" as our additional lawful basis for processing special category personal data (that which reveals racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, genetic or biometric data, and data concerning health, sex life or sexual orientation).

How do we follow data protection principles?

- We have lawful bases for processing personal and special category data.
- Data are used fairly and transparently; we will make it clear to individuals what their data will be used for, how it will be handled and what their rights are.
- We only collect and use personal data for our research, for research in the public interest, or to support the work of our organisation.
- We only collect the minimum amount of personal data which we need for our purposes.
- We take steps to ensure that the personal data we hold is accurate.
- We keep your personal data in an identifiable format for the minimum time required.
- We take steps to ensure that your data is held securely.
- We keep a record of our processing activities.

What do we do with personal data?

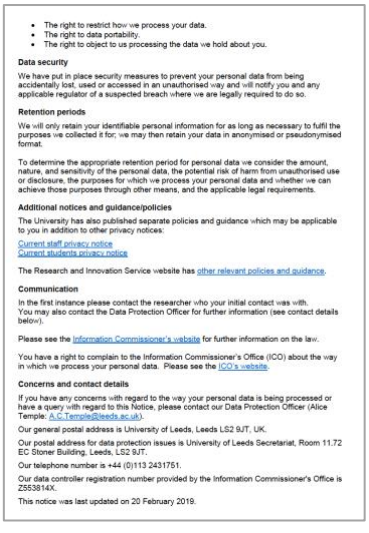
Research data can be a very valuable resource for improving public services and our understanding of the societies we live in. One way we can get the most benefit from this work is to make the data available, usually when the research has finished, to other researchers. Sometimes these researchers will be based outside the European Union. We will only ever share research data with organisations that can guarantee to store it securely. We will never sell your personal data, and any data shared cannot be used to contact individuals.

The project specific information will include more detail about how your data will be used.

Your rights as a data subject

Because we use personals data to support scientific research on the public interest, individuals participating in research do not have the same rights regarding their personal data as they would in other situations. This means that the following rights are limited for individuals who participate, or have participated in, a research project:

- The right to access the data we hold about you.
- The right to rectify the data we hold about you.
- The right to have the data we hold about you erased.



- The right to restrict how we process your data.
- The right to data portability.
- The right to object to us processing the data we hold about you.

Data security

We have put in place security measures to prevent your personal data from being accidentally lost, used or accessed in an unauthorised way and will notify you and any applicable regulator of a suspected breach where we are legally required to do so.

Retention periods

We will only retain your identifiable personal information for as long as necessary to fulfil the purposes we collected it for; we may then retain your data in anonymised or pseudonymised format.

To determine the appropriate retention period for personal data we consider the amount, nature, and sensitivity of the personal data, the potential risk of harm from unauthorised use or disclosure, the purposes for which we process your personal data and whether we can achieve those purposes through other means, and the applicable legal requirements.

Additional notices and guidance/policies

The University has also published separate policies and guidance which may be applicable to you in addition to other privacy notices:

Current staff privacy notice
Current students privacy notice

The Research and Innovation Service website has other relevant policies and guidance.

Communication

In the first instance please contact the researcher who your initial contact was with. You may also contact the Data Protection Officer for further information (see contact details below).

Please see the Information Commissioner's website for further information on the law.

You have a right to complain to the Information Commissioner's Office (ICO) about the way in which we process your personal data. Please see the ICO's website.

Concerns and contact details

If you have any concerns with regard to the way your personal data is being processed or have a query with regard to this Notice, please contact our Data Protection Officer (Alice Temple: A.C.Temple@leeds.ac.uk).

Our general postal address is University of Leeds, Leeds LS2 9JT, UK.

Our postal address for data protection issues is University of Leeds Secretariat, Room 11.72 EC Stoner Building, Leeds, LS2 9JT.

Our telephone number is +44 (0)113 2431751.

Our data controller registration number provided by the Information Commissioner's Office is Z553814X.

This notice was last updated on 20 February 2019.

E.7 Participant consent form, version 1.6, dated 31.01.2022

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NHS Leeds Community Healthcare

Consent to take part in: Appetitive Traits and Weight Management

IRAS ID: 304296
Participant Identification Number:

Research team and contact details:

Stacey Boardman, Psychologist in Clinical Training, The University of Leeds

lcht.appetitivetraitsresearch@nhs.net

Dr Rebecca Beeken, Associate Professor of Behavioural Medicine, The University of Leeds.

Dr Alison Fildes, University Academic Fellow, The University of Leeds.

Dr Anuradha Menon, Consultant in Liaison Psychiatry and Medical Psychotherapy, Leeds and York Partnership NHS Foundation Trust.

		Please type your initials if you agree
1.1	I confirm that I have read and understand the information sheet dated 22.11.2021 explaining the above research project.	
1.2	I confirm that I have not previously received bariatric surgery.	
1.3	I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily	
1.4	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my medical care or legal rights being affected. I understand that if I withdraw from the study, any data collected up to the point of withdrawal will be used.	
1.5	I understand that members of the research team may have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.	
1.6	I understand that my responses will be kept strictly confidential. I understand that my confidentiality will only be breached if the researcher/clinical team, during the study, has reason to believe that I am at risk of harming myself or others and this may involve a member of the research /clinical team contacting me.	

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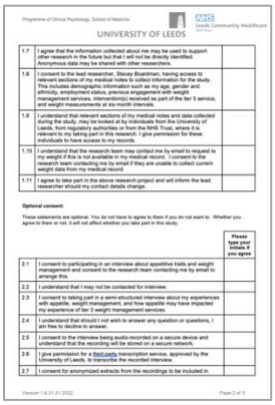

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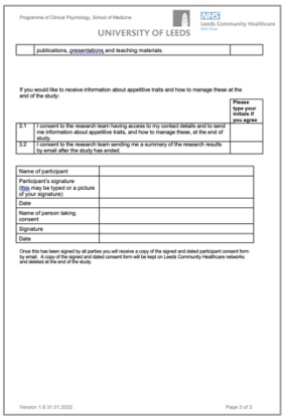
1.7	I agree that the information collected about me may be used to support other research in the future but that I will not be directly identified. Anonymous data may be shared with other researchers.	
1.8	I consent to the lead researcher, Stacey Boardman, having access to relevant sections of my medical notes to collect information for the study. This includes demographic information such as my age, gender and ethnicity, employment status, previous engagement with weight management services, bariatric/gastric/ weaned as part of the tier 3 service, and weight measurements at six-month intervals.	
1.9	I understand that relevant sections of my medical notes and data collected during the study, may be looked at by individuals from the University of Leeds, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
1.10	I understand that the research team may contact me by email to request to my weight if this is not available in my medical record. I consent to the research team contacting me by email if they are unable to collect current weight data from my medical record	
1.11	I agree to take part in the above research project and will inform the lead researcher should my contact details change.	

Optional consent:

These statements are optional. You do not have to agree to them if you do not want to. Whether you agree to them or not, it will not affect whether you take part in this study.

		Please type your initials if you agree
2.1	I consent to participating in an interview about appetitive traits and weight management and consent to the research team contacting me by email to arrange this.	
2.2	I understand that I may not be contacted for interview.	
2.3	I consent to taking part in a semi-structured interview about my experiences with appetite, weight management, and how appetite may have impacted my experience of tier 3 weight management services.	
2.4	I understand that should I not wish to answer any question or questions, I am free to decline to answer.	
2.5	I consent to the interview being audio-recorded on a secure device and understand that the recording will be stored on a secure network.	
2.6	I give permission for a third-party transcription service, approved by the University of Leeds, to transcribe the recorded interview.	
2.7	I consent for anonymized extracts from the recordings to be included in	

Version 1.6 31.01.2022 Page 2 of 3



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	publications, presentations and teaching materials.	

If you would like to receive information about appetitive traits and how to manage these at the end of the study:

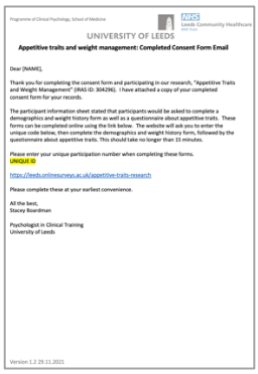
		Please type your initials if you agree
3.1	I consent to the research team having access to my contact details and to send me information about appetitive traits, and how to manage these, at the end of study.	
3.2	I consent to the research team sending me a summary of the research results by email after the study has ended.	

Name of participant	
Participant's signature (this may be typed or a picture of your signature)	
Date	
Name of person taking consent	
Signature	
Date	

Once this has been signed by all parties you will receive a copy of the signed and dated participant consent form by email. A copy of the signed and dated consent form will be kept on Leeds Community Healthcare networks and deleted at the end of the study.

Version 1.6 31.01.2022 Page 3 of 3

E.8 Completed consent form email, version 1.2, dated 29.11.2021



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Appetitive traits and weight management: Completed Consent Form Email

Dear [NAME],

Thank you for completing the consent form and participating in our research, "Appetitive Traits and Weight Management" (IRAS ID: 304296). I have attached a copy of your completed consent form for your records.

The participant information sheet stated that participants would be asked to complete a demographics and weight history form as well as a questionnaire about appetitive traits. These forms can be completed online using the link below. The website will ask you to enter the unique code below, then complete the demographics and weight history form, followed by the questionnaire about appetitive traits. This should take no longer than 15 minutes.

Please enter your unique participation number when completing these forms.
UNIQUE ID

https://leeds.onlinesurveys.ac.uk/appetitive-traits-research

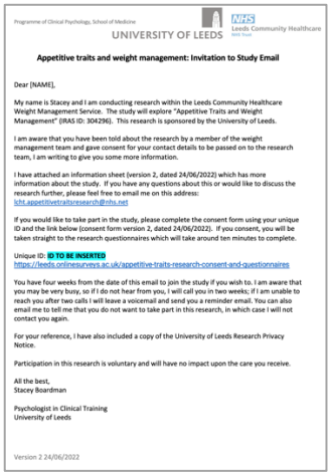
Please complete these at your earliest convenience.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1.2 29.11.2021

E.9 Invitation to study email, version 2, dated 24.06.2022



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Appetitive traits and weight management: Invitation to Study Email

Dear [NAME],

My name is Stacey and I am conducting research within the Leeds Community Healthcare Weight Management Service. The study will explore "Appetitive Traits and Weight Management" (IRAS ID: 304296). This research is sponsored by the University of Leeds.

I am aware that you have been told about the research by a member of the weight management team and gave consent for your contact details to be passed on to the research team, I am writing to give you some more information.

I have attached an information sheet (version 2, dated 24/06/2022) which has more information about the study. If you have any questions about this or would like to discuss the research further, please feel free to email me on this address:
lcht.appetitivetraitsresearch@nhs.net

If you would like to take part in the study, please complete the consent form using your unique ID and the link below (consent form version 2, dated 24/06/2022). If you consent, you will be taken straight to the research questionnaires which will take around ten minutes to complete.

Unique ID: ID TO BE INSERTED
https://leeds.onlinesurveys.ac.uk/appetitive-traits-research-consent-and-questionnaires

You have four weeks from the date of this email to join the study if you wish to. I am aware that you may be very busy, so if I do not hear from you, I will call you in two weeks; if I am unable to reach you after two calls I will leave a voicemail and send you a reminder email. You can also email me to tell me that you do not want to take part in this research, in which case I will not contact you again.

For your reference, I have also included a copy of the University of Leeds Research Privacy Notice.

Participation in this research is voluntary and will have no impact upon the care you receive.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

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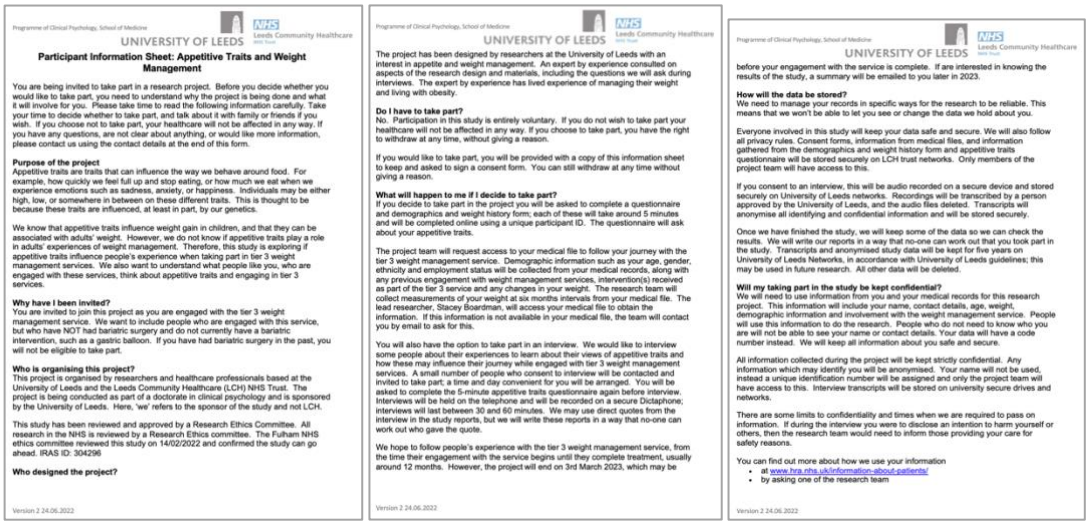
E.10 Participant information sheet, version 2, dated 24.06.2022



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Participant Information Sheet: Appetitive Traits and Weight Management

You are being invited to take part in a research project. Before you decide whether you would like to take part, you need to understand why the project is being done and what it will involve for you. Please take time to read the following information carefully. Take your time to decide whether to take part, and talk about it with family or friends if you wish. If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information, please contact us using the contact details at the end of this form.

Purpose of the project

Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness. Individuals may be either high, low, or somewhere in between on these different traits. This is thought to be because these traits are influenced, at least in part, by our genetics.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. We also want to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

Why have I been invited?

You are invited to join this project as you are engaged with the tier 3 weight management service. We want to include people who are engaged with this service, but who have NOT had bariatric surgery and do not currently have a bariatric intervention, such as a gastric balloon. If you have had bariatric surgery in the past, you will not be eligible to take part.

Who is organising this project?

This project is organised by researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds. Here, 'we' refers to the sponsor of the study and not LCH.

This study has been reviewed and approved by a Research Ethics Committee. All research in the NHS is reviewed by a Research Ethics committee. The Fulham NHS ethics committee reviewed this study on 14/02/2022 and confirmed the study can go ahead. IRAS ID: 304296

Who designed the project?

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The project has been designed by researchers at the University of Leeds with an interest in appetite and weight management. An expert by experience consulted on aspects of the research design and materials, including the questions we will ask during interviews. The expert by experience has lived experience of managing their weight and living with obesity.

Do I have to take part?

No. Participation in this study is entirely voluntary. If you do not wish to take part your healthcare will not be affected in any way. If you choose to take part, you have the right to withdraw at any time, without giving a reason.

If you would like to take part, you will be provided with a copy of this information sheet to keep and asked to sign a consent form. You can still withdraw at any time without giving a reason.

What will happen to me if I decide to take part?

If you decide to take part in the project you will be asked to complete a questionnaire and demographics and weight history form; each of these will take around 5 minutes and will be completed online using a unique participant ID. The questionnaire will ask about your appetitive traits.

The project team will request access to your medical file to follow your journey with the tier 3 weight management service. Demographic information such as your age, gender, ethnicity and employment status will be collected from your medical records, along with any previous engagement with weight management services, intervention(s) received as part of the tier 3 service and any changes in your weight. The research team will collect measurements of your weight at six months intervals from your medical file. The lead researcher, Stacey Boardman, will access your medical file to obtain the information. If this information is not available in your medical file, the team will contact you by email to ask for this.

You will also have the option to take part in an interview. We would like to interview some people about their experiences to learn about their views of appetitive traits and how these may influence their journey while engaged with tier 3 weight management services. A small number of people who consent to interview will be contacted and invited to take part; a time and day convenient for you will be arranged. You will be asked to complete the 5-minute appetitive traits questionnaire again before interview. Interviews will be held on the telephone and will be recorded on a secure Dictaphone; interviews will last between 30 and 60 minutes. We may use direct quotes from the interview in the study reports, but we will write these reports in a way that no-one can work out who gave the quote.

We hope to follow people's experience with the tier 3 weight management service, from the time their engagement with the service begins until they complete treatment, usually around 12 months. However, the project will end on 3rd March 2023, which may be

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before your engagement with the service is complete. If are interested in knowing the results of the study, a summary will be emailed to you later in 2023.

How will the data be stored?

We need to manage your records in specific ways for the research to be reliable. This means that we won't be able to let you see or change the data we hold about you.

Everyone involved in this study will keep your data safe and secure. We will also follow all privacy rules. Consent forms, information from medical files, and information gathered from the demographics and weight history form and appetitive traits questionnaire will be stored securely on LCH trust networks. Only members of the project team will have access to this.

If you consent to an interview, this will be audio recorded on a secure device and stored securely on University of Leeds networks. Recordings will be transcribed by a person approved by the University of Leeds, and the audio files deleted. Transcripts will anonymise all identifying and confidential information and will be stored securely.

Once we have finished the study, we will keep some of the data so we can check the results. We will write our reports in a way that no-one can work out that you took part in the study. Transcripts and anonymised study data will be kept for five years on University of Leeds Networks, in accordance with University of Leeds guidelines; this may be used in future research. All other data will be deleted.

Will my taking part in the study be kept confidential?

We will need to use information from you and your medical records for this research project. This information will include your name, contact details, age, weight, demographic information and involvement with the weight management service. People will use this information to do the research. People who do not need to know who you are will not be able to see your name or contact details. Your data will have a code number instead. We will keep all information about you safe and secure.

All information collected during the project will be kept strictly confidential. Any information which may identify you will be anonymised. Your name will not be used, instead a unique identification number will be assigned and only the project team will have access to this. Interview transcripts will be stored on university secure drives and networks.

There are some limits to confidentiality and times when we are required to pass on information. If during the interview you were to disclose an intention to harm yourself or others, then the research team would need to inform those providing your care for safety reasons.

You can find out more about how we use your information

- at www.hra.nhs.uk/information-about-patients/
- by asking one of the research team

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- by sending an email to: lcht.appetitivetraitsresearch@nhs.net

What will happen if I no longer wish to take part?

You can stop being part of the study at any time, without giving a reason, but we will keep information about you that we already have. The same goes for if you lose capacity to continue to participate.

If you participate in an interview, you do not have to answer all questions. If you do not wish to answer a particular question, let the researcher know and they will move onto the next question. You can withdraw from the study after interview, but any data collected will be used. To ensure anonymity, pseudonyms will be used and identifying details will be removed.

What are the possible risks and disadvantages of taking part?

There are no serious risks to taking part. The questionnaire will ask about your appetite and eating behaviours. During the interview, questions will be asked about your weight, how you have managed this in the past and your experiences. These questions may be upsetting. You will have the right to decline to answer a question or to end the interview at any time, without giving a reason.

If you become upset and feel you need support following involvement in the study, you can contact your clinical team. For a mental health crisis call the Single Point of Access (SPA) on 0800 183 1485 or, if you are experiencing distress or despair freephone Samaritans 116 123.

Participation in this process is voluntary and will not impact any current or future access to NHS services.

What are the possible benefits of taking part?

Taking part in the project may provide an opportunity to learn about appetitive traits and to consider how appetitive traits impact your weight management experiences.

At the end of the study, you can choose to receive information about appetitive traits and how to manage these.

It is hoped that this research will help to inform service provision in tier 3 services.

What if there is a problem?

If you have a concern about any aspect of this study, you can contact the project lead, Stacey Boardman, who will do their best to answer your questions. Their contact details can be found at the bottom of this page.

What will happen with the results of the project?

When the project ends the researchers will analyse the data and write up the results as part of a doctoral dissertation. This document will be used internally within the LCH Trust (e.g. at departmental and service level meetings) to inform service development.

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Parts of the project may be published in peer-reviewed publications or at research conferences. If you wish, you can chose to receive a summary of the study findings when the study is complete. No identifying information will be included in any reports.

How do I take part?

You can take part in this study by contacting the research team by email: lcht.appetitivetraitsresearch@nhs.net

Contact details:

Stacey Boardman, Psychologist in Clinical Training, The University of Leeds

ps10s2b@leeds.ac.uk

This project is supervised by Dr Rebecca Beeken, Dr Alison Fildes and Dr Anuradha Menon. If you have any concerns you are able to contact these supervisors with the details below.

Dr Rebecca Beeken, Associate Professor of Behavioural Medicine, The University of Leeds.

r.beeken@leeds.ac.uk

Dr Alison Fildes, University Academic Fellow, The University of Leeds. a.fildes@leeds.ac.uk

Dr Anuradha Menon, Consultant in Liaison Psychiatry and Medical Psychotherapy, Leeds and York Partnership NHS Foundation Trust. anuradha.menon@nhs.net

Complaints and independent advice

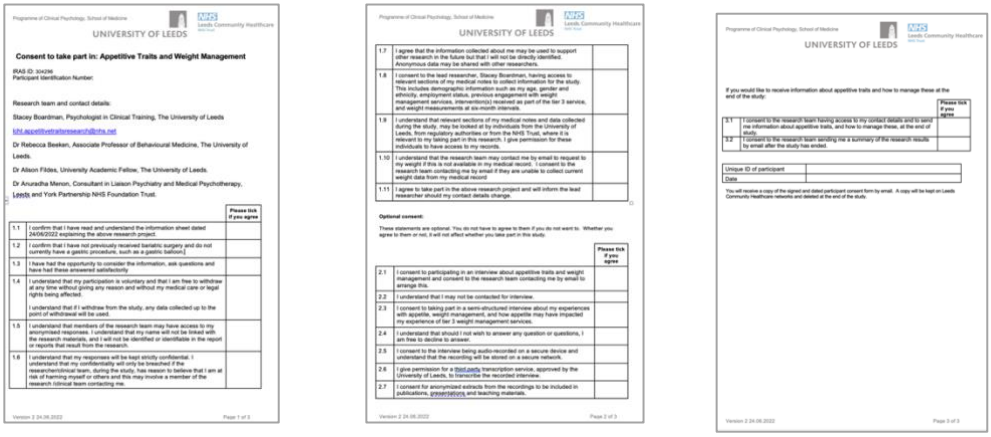
If you would like to make a complaint about how the research team has managed your data you should contact the lead researcher, Stacey Boardman (ps10s2b@leeds.ac.uk)

If you feel this has not resolved the issue you can contact the Data Protection Officer on dpo@leeds.ac.uk

If you are not happy with the response from the Data Protection Officer, or believe that your data is being processed in an unlawful or incorrect way, you can complain to the Information Commissioner's Office (ICO) at: www.ico.org.uk or call them on 0303 123 1113

Version 2 24.06.2022

E.11 Participant consent form, version 2, dated 24.06.2022



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Consent to take part in: Appetitive Traits and Weight Management

IRAS ID: 304296
Participant Identification Number:

Research team and contact details:

Stacey Boardman, Psychologist in Clinical Training, The University of Leeds

lcht.appetitivetraitsresearch@nhs.net

Dr Rebecca Beeken, Associate Professor of Behavioural Medicine, The University of Leeds

Dr Alison Fildes, University Academic Fellow, The University of Leeds.

Dr Anuradha Menon, Consultant in Liaison Psychiatry and Medical Psychotherapy, Leeds and York Partnership NHS Foundation Trust.

		Please tick if you agree
1.1	I confirm that I have read and understand the information sheet dated 24/06/2022 explaining the above research project.	
1.2	I confirm that I have not previously received bariatric surgery and do not currently have a gastric procedure, such as a gastric balloon.	
1.3	I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.	
1.4	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my medical care or legal rights being affected. I understand that if I withdraw from the study, any data collected up to the point of withdrawal will be used.	
1.5	I understand that members of the research team may have access to my anonymised responses. I understand that my name will not be linked with the research materials, and I will not be identified or identifiable in the report or reports that result from the research.	
1.6	I understand that my responses will be kept strictly confidential. I understand that my confidentiality will only be breached if the researcher/clinical team, during the study, has reason to believe that I am at risk of harming myself or others and this may involve a member of the research /clinical team contacting me.	

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1.7	I agree that the information collected about me may be used to support other research in the future but that I will not be directly identified. Anonymous data may be shared with other researchers.	
1.8	I consent to the lead researcher, Stacey Boardman, having access to relevant sections of my medical notes to collect information for the study. This includes demographic information such as my age, gender and ethnicity, employment status, previous engagement with weight management services, intervention(s) received as part of the tier 3 service, and weight measurements at six-month intervals.	
1.9	I understand that relevant sections of my medical notes and data collected during the study, may be looked at by individuals from the University of Leeds, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records.	
1.10	I understand that the research team may contact me by email to request to my weight if this is not available in my medical record. I consent to the research team contacting me by email if they are unable to collect current weight data from my medical record	
1.11	I agree to take part in the above research project and will inform the lead researcher should my contact details change.	

Optional consent:

These statements are optional. You do not have to agree to them if you do not want to. Whether you agree to them or not, it will not affect whether you take part in this study.

		Please tick if you agree
2.1	I consent to participating in an interview about appetitive traits and weight management and consent to the research team contacting me by email to arrange this.	
2.2	I understand that I may not be contacted for interview.	
2.3	I consent to taking part in a semi-structured interview about my experiences with appetite, weight management, and how appetite may have impacted my experience of tier 3 weight management services.	
2.4	I understand that should I not wish to answer any question or questions, I am free to decline to answer.	
2.5	I consent to the interview being audio-recorded on a secure device and understand that the recording will be stored on a secure network.	
2.6	I give permission for a third party transcription service, approved by the University of Leeds, to transcribe the recorded interview.	
2.7	I consent for anonymized extracts from the recordings to be included in publications, presentations, and teaching materials.	

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If you would like to receive information about appetitive traits and how to manage these at the end of the study:

		Please tick if you agree
3.1	I consent to the research team having access to my contact details and to send me information about appetitive traits, and how to manage these, at the end of study.	
3.2	I consent to the research team sending me a summary of the research results by email after the study has ended.	

Unique ID of participant	
Date	

You will receive a copy of the signed and dated participant consent form by email. A copy will be kept on Leeds Community Healthcare networks and deleted at the end of the study.

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E.12 Completed consent form email, version 2, dated 24.06.2022

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Appetitive traits and weight management: Consent Confirmation Email

Dear [NAME],

Thank you for completing the consent form and participating in our research, "Appetitive Traits and Weight Management" (IRAS ID: 304296).

Please find attached a copy of your completed consent form.

Thank you for participating in this research.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1 24.06.2022

E.13 Standardised phone call reminder script, version 1, dated 24.06.2022

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Standardised Phone Call Reminder Script: Appetitive Traits and Weight Management

IRAS ID: 304296

This standardised script will be used by the lead researcher, Stacey Boardman, when prospective participants have not responded to the initial study email (Invitation to Study Email 2, dated 24/06/2022) for 14 days.

Prospective participants will be called to remind them about the invitation to the study. If the call is not answered, a second attempt will made within one week. If neither call is answered, a voicemail will be left (please see script below) and a follow-up email sent (Invitation to Study Reminder Email 2, dated 24/06/2022).

Phone call script (if called answered):

"Good morning/afternoon, please can I speak with [prospective participants name]?

My name is Stacey, I sent you an email two weeks ago inviting you to take part in research related to the Tier 3 Weight Management Service. I am calling as I have not yet received a response and wanted to take the opportunity to remind you about the research and participation, if this is something you are still interested in."

If prospective participant is not interested in the study:
"Thank you for your time, we will make no further contact about the study."

If prospective participant asks more about the study:
"I have organised this study with researchers and healthcare professionals based at the University of Leeds and the Leeds Community Healthcare (LCH) NHS Trust. The project is being conducted as part of a doctorate in clinical psychology and is sponsored by the University of Leeds.

The study is interested in the relationship between appetitive traits and weight management. Appetitive traits are traits that can influence the way we behave around food. For example, how quickly we feel full up and stop eating, or how much we eat when we experience emotions such as sadness, anxiety, or happiness.

We know that appetitive traits influence weight gain in children, and that they can be associated with adults' weight. However, we do not know if appetitive traits play a role in adults' experiences of weight management. Therefore, this study is exploring if appetitive traits influence people's experience when taking part in tier 3 weight management services. The

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researchers would also like to understand what people like you, who are engaged with these services, think about appetitive traits and engaging in tier 3 services.

If you decide to take part in the project you will be asked to complete a questionnaire and demographics and weight history form, each of these will take around 5 minutes and will be completed online using a unique participant ID. The questionnaire will ask about your appetitive traits. A small number of people will be invited to attend an optional interview about their experiences of appetitive traits and tier 3 services.

The research team will need to use information from your medical records for this research project. This information will include your name, contact details, age, weight, demographic information and involvement with the weight management service.

The research team want to include people who are engaged with this service, but who have NOT had bariatric surgery or bariatric procedures such as gastric balloons. If you have had bariatric procedures in the past, you will not be eligible to take part. As the study involves completing questionnaires in English, participants need to be able to understand both verbal and written English.

If you choose not to take part, your healthcare will not be affected in any way. If you have any questions, are not clear about anything, or would like more information the researchers have an email address you can contact them on.

I have previously sent an email with an information sheet about the study, do you still have this or would you like me to send it again?

Are you interested in this study?"

If interested:
"Thank you for your interest in this study. To take part in this study you will need to complete a consent form, the link for this in the email I previously sent. Do you still have the email, or would you like me to resend it now?"

If not interested:
"Thank you for taking the time to learn about this study."

Phone call script (if called not answered on two occasions and voicemail is available):
"Good morning/afternoon, my name is Stacey, I sent you an email two weeks ago inviting you to take part in some research. As I have been unable to reach you, I will send you another email about the research. If you have any questions about this, you can contact me on the study email. Thanks for expressing interest in the study and I hope to hear from you soon."

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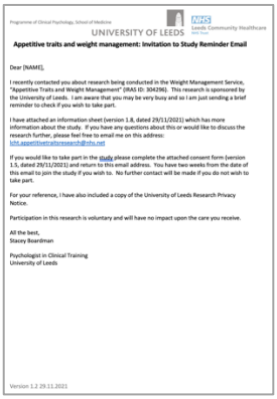
E.14 Invitation to study reminder email, version 1.2, dated 29.11.2021



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Appetitive traits and weight management: Invitation to Study Reminder Email

Dear [NAME],

I recently contacted you about research being conducted in the Weight Management Service, "Appetitive Traits and Weight Management" (IRAS ID: 304296). This research is sponsored by the University of Leeds. I am aware that you may be very busy and so I am just sending a brief reminder to check if you wish to take part.

I have attached an information sheet (version 1.8, dated 29/11/2021) which has more information about the study. If you have any questions about this or would like to discuss the research further, please feel free to email me on this address:
lch.appetitivetraitsresearch@nhs.net

If you would like to take part in the study please complete the attached consent form (version 1.5, dated 29/11/2021) and return to this email address. You have two weeks from the date of this email to join the study if you wish to. No further contact will be made if you do not wish to take part.

For your reference, I have also included a copy of the University of Leeds Research Privacy Notice.

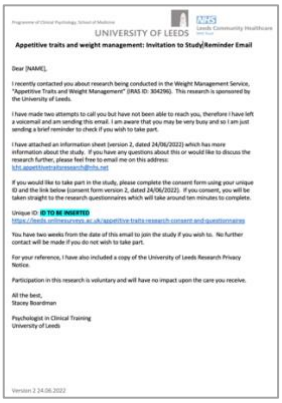
Participation in this research is voluntary and will have no impact upon the care you receive.

All the best,
Stacey Boardman

Psychologist in Clinical Training
University of Leeds

Version 1.2 29.11.2021

E.15 Invitation to study reminder email, version 2, dated 24.06.2022



Appetitive traits and weight management: Invitation to Study/Reminder Email

Dear [NAME],

I recently contacted you about research being conducted in the Weight Management Service, "Appetitive Traits and Weight Management" (IRAS ID: 304396). This research is sponsored by the University of Leeds.

I have made two attempts to call you but have not been able to reach you, therefore I have left a voicemail and am sending this email. I am aware that you may be very busy and so I am just sending a brief reminder to check if you wish to take part.

I have attached an information sheet (version 2, dated 24/06/2022) which has more information about the study. If you have any questions about this or would like to discuss the research further, please feel free to email me on this address: lch.appetitivetraitsresearch@nhs.net

If you would like to take part in the study, please complete the consent form using your unique ID and the link below (consent form version 2, dated 24/06/2022). If you consent, you will be taken straight to the research questionnaires which will take around ten minutes to complete.

Unique ID: ID TO BE INSERTED
https://leeds.onlinesurveys.ac.uk/appetitive-traits-research-consent-and-questionnaires

You have two weeks from the date of this email to join the study if you wish to. No further contact will be made if you do not wish to take part.

For your reference, I have also included a copy of the University of Leeds Research Privacy Notice.

Participation in this research is voluntary and will have no impact upon the care you receive.

All the best,
Stacey Boardman

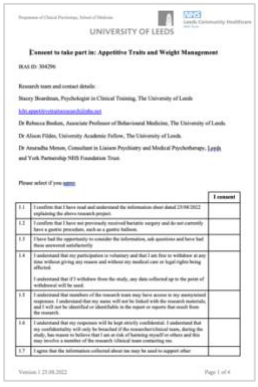
Psychologist in Clinical Training
University of Leeds

Version 2 24.06.2022

E.16 Service wide participant information sheet, version 1, dated 12.08.2022

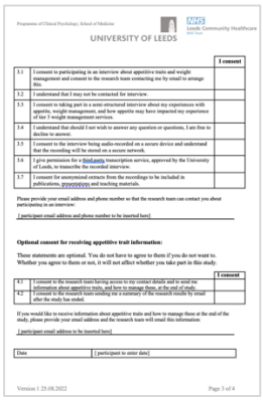
Service Wide Participant Information Sheet: Appetitive Traits and Weight Management

E.17 Service wide consent form, version 1, dated 25.08.2022



Consent to take part in: Appetitive Traits and Weight Management

IRAS ID: 304396



If you have supplied your email address, you will receive a copy of the signed and dated participant consent form by email. A copy will be kept on Leeds Community Healthcare networks and deleted at the end of the study.

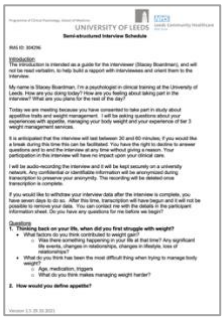
Appendix F

Interview materials

F.1 Invitation to interview email, 1.2, dated 29.11.2021

F.2 Invitation to interview reminder email, 1.2, dated 29.11.2021

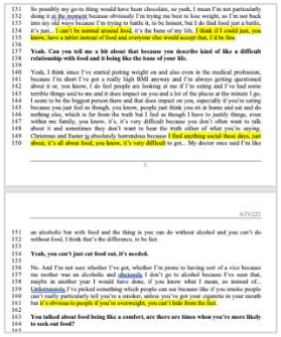
F.3 Interview schedule, version 1.5, dated 29.11.2021

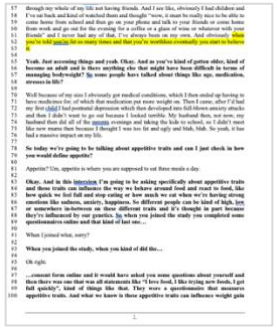


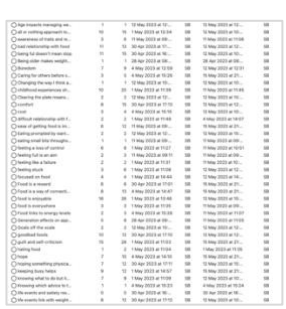
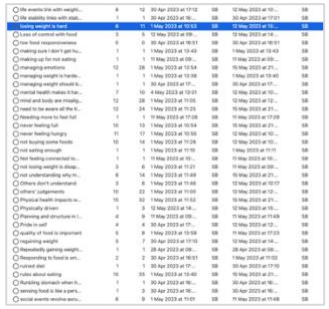
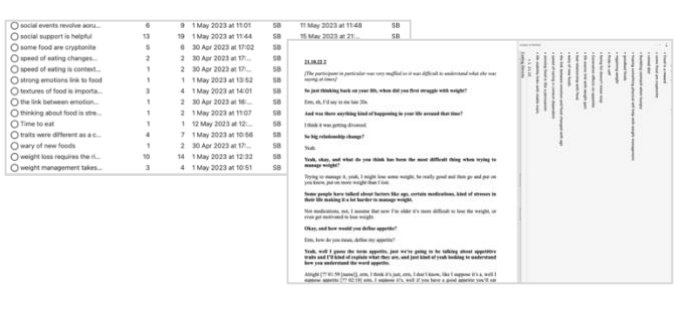
Appendix G

Qualitative analysis and interpretation process

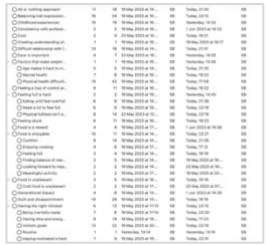
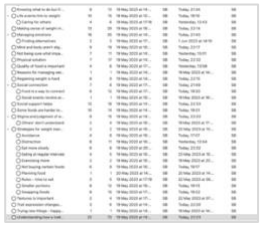
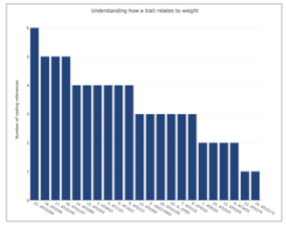
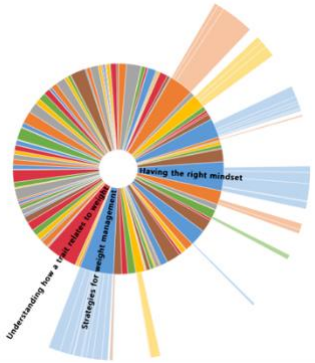
Present	Phase	Activity
Stacey	Familiarisation of notes	Reading transcriptions of interviewees, refreshing my memory of interactions with participants. Noted casual observation of initial trends and potentially interesting parts of transcriptions.

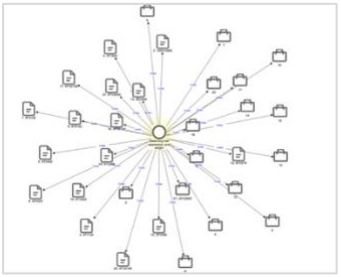




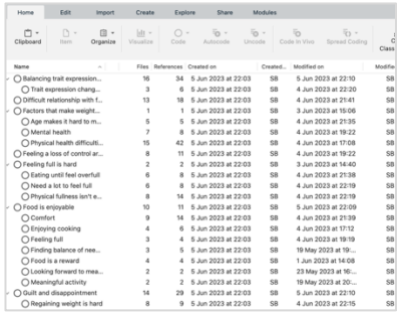




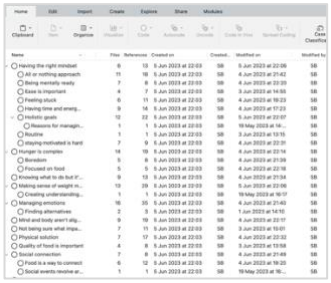
Stacey	Systemic data coding	Stacey made brief codes based on interviewees descriptions, which would create and understanding of participants specific appetitive traits

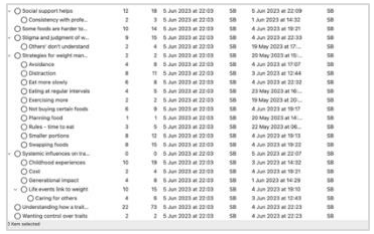







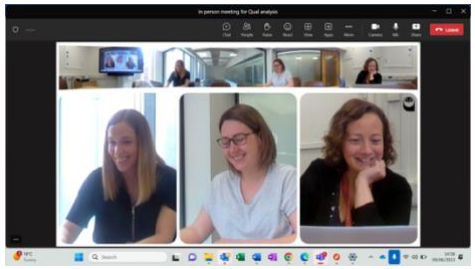
Stacey	Generating initial themes from coded data	Stacey generated initial codes with the research question in mind and noted that it was difficult to switch between being embedded in participants' accounts to the appetitive trait framework.

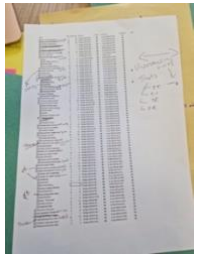






Stacey Rebecca Alison Anu	Developing and reviewing themes	The research team met in person to discuss codes, initial themes, and develop themes. We discussed which traits seemed to have the greatest influence on participants experiences of weight management and agreed to group the traits which were reported to have less influence. Some themes which were agreed to be included in the Appendix were later removed as they were deemed to be codes which linked with other themes, or were deemed only codes rather than themes.





Stacey, Rebecca and Alison	Refining, defining and naming themes	Each individual theme and sub-theme was considered in relation to both the dataset and the research question.
Stacey	Writing the project	Stacey decided to present themes in the order of perceived importance to participants, while also allowing a narrative about their experiences of managing appetitive traits, and the links between traits.

Appendix H

Additional Themes

During the analysis, themes which were unrelated to appetitive traits were raised by participants. These themes reflect the lived experience of participants and are important to acknowledge and consider when exploring people's experiences of managing weight; specifically trying to lose weight.

H.1 Personal factors make losing weight harder

Participants spoke about how personal factors including age, mental health and physical health impacted on weight management. Some participants talked about how losing weight became harder with age: "as I'm getting older it's even harder to take it off and I always seem to slide back up to the same weight, as if my body remembers" (Lucy). Hayley reflected on the relationship between age, weight and health in a conversation with her doctor, who said "it's the three F's, you're fat, you're fifty and you're fucked!" Mel talked about how conditions relating to a higher body weight were more noticeable with age, and that these in turn made it harder to lose weight; "I noticed, not necessarily it was harder to lose weight but I could feel the effect of being overweight. So, on joints, muscular pain, less mobility and that was kind of like the big trigger point for me to do something positive about it."

Several participants spoke of how difficulties with mental health led to changes in body weight, and made it difficult to manage weight. Malia shared: "after I'd had my first child I had postnatal depression which then developed into full-blown anxiety attacks and then I didn't want to go out because I looked terrible". Zara also experienced post-natal depression but found that she then stopped eating, leading a loss of body weight.

Most participants spoke about how physical health conditions impacted their energy levels, ability to maintain focus on weight management, and ability to engage in exercise to manage weight. Some participants began to experience physical health difficulties at a young age, Zara shared: "I started with arthritis at a very young age and it kind of got me down […] throughout my whole life I've had one illness after another […] I've got into a lot of comfort eating". For Alex, having physical health conditions reduced their energy levels, which impacted food choices: "sometimes I just don't have the energy to cook, so we'll get take-in, takeaway".

Being in physical pain meant that exercise was difficult, which negatively impacted managing weight for Dave: "I have severe osteoarthritis in my knees, one knee the cartilage has almost completely gone, it's bone-on-bone so I can't walk any great distance of say more than four or five metres, I can't do stairs without a significant amount of pain and somebody helping me". Physical health difficulties for Logan meant that "losing weight

was not on my horizon because I was trying to resolve one thing before I could do the other."

Emma spoke about how having a knee replacement helped her to become more physically active, and although this helped, she felt an understanding of appetitive traits was needed: "I've had both me knees replaced but I know that that has helped me walk where I don't know if this is going to help me with food".

Some participants acknowledged the relationship between weight and physical health conditions, and that losing weight could help to alleviate pain and discomfort. Ali spoke of how weight management injections had helped to reduce their levels of hunger, which in turn they required less insulin to manage diabetes: "it's far better managed now than it was before, so that's a great improvement as well and I'm having less Insulin than I was before because I'm eating less".

H.2 Systemic influences on weight

Some participants reflected on how systemic factors impacted weight loss attempts, particularly the cost of living and generational impacts. Vicki shared her experiences with managing finances when trying to lose weight: "when you're buying food on a diet it's exceedingly expensive and okay, that doesn't help in the current climate either really but we try." Cost was also a factor in Gerri's willingness to try new foods, as the potential financial lost should the meal not turn out as hoped was high: "I don't have a lot of money so […] I won't go spend all this money to buy new, to create something new to find I don't like it because it's just a waste of money".

Participants recognised patterns within their families relating to weight, and expressed curiosity about whether this may indicate their own future weight: "genetically it's in there and then stuff like that doesn't help, does it" (Logan). Sometimes differences between the appetitive traits of participants and their family members seemed stark, and participants struggled to make sense of why they were different: "My dad he used to eat to survive, he never really enjoyed food and he you know, he would have very small portions of food […] he wouldn't overeat or anything, […] whereas I would just eat" (Caroline).

Participants were also aware of their impact on later generations, and wanting to set good examples and ideals. Emma spoke of her difficulties managing weight and her consideration of whether surgical intervention may be helpful, and what message this may communicate to loved ones "I've got granddaughters and what... Yeah, and I'm thinking what does that teach them as well sort of thing, psychologically so, you know, I wouldn't want them to think if they'd put a bit of weight on that they'd have to, you know, go and have surgery so I've got to be careful of, it's not just my... Sort of like it's theirs as well".

H.3 Having the right mindset

Participants repeatedly spoke of how having the right mind set was key to weight management, and that this meant being aware of managing weight in all daily activities and that losing this awareness was the "biggest risk" (Rowan); "you've got to be in the right mindset, you've got to want to do it, you've got to be available and actively doing it" (Hayley).

Being mentally ready to engage in weight management for participants meant being "more aware of things you're supposed to have, you should be eating" (Lucy). This awareness was described as difficult to maintain as individuals' energy levels changed over time and their emotions influenced their level of awareness.

Mostly, participants described having holistic goals as a helpful contributor to maintaining the right mindset. Participants goals were centred around things such as improving physical health, reducing levels of pain, being more physically active and being able to buy clothes from the supermarket, "go and buy clothes from a supermarket for example that generally don't go up past 20, you know. But yeah, a size 16 would be amazing" (Malia). Dave had an "epiphany of like I'm going to die if I don't lose this weight". Reaching these goals would also positively impact important relationships; "exciting and of course I want to be able to run round and kick a ball with my grandson" (Malia). Understanding changes in not only weight but the physical body helped Alex to continue towards their goal, when they were informed by a doctor "even though you get on the scales and you've lost a pound, a pound is coming from your insides, it's cleaning your liver, it's going from your heart, it's going from your lungs, and that has changed my opinion".