UNDERSTANDING THE PSYCHOLOGICAL FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY

ESME BANTING

A thesis submitted in partial fulfilment of the requirements of the degree of Doctor of Clinical Psychology, validated by the University of Oxford

(Trinity Term)

July 2017

Word Count: 20,324

Paper A: 11,644

Paper B: 8,680

Understanding the psychological factors associated with overweight and obesity

Esme Banting
Harris Manchester College, University of Oxford
Doctorate in Clinical Psychology
Trinity Term 2017

Abstract

Obesity is one of the most serious public health challenges of the 21st century, associated with a range of adverse physical, psychological, social and economic consequences. The aetiology of obesity is complex; however, the psychological factors associated with overweight and obesity remain poorly understood.

The first paper critically appraises evidence for three of the most developed psychological theories of obesity. Based on these findings, literature from the fields of emotion regulation and attachment are reviewed, and a novel developmental theory of obesity based on an integration of these theoretical constructs is proposed. Recommendations for future research based on a theoretical framework of emotion regulation are made, and implications for clinical practice including a focus on enhancing caregiver sensitivity are highlighted.

The second paper explores the applicability of an established cognitive model of Bulimia Nervosa (BN) and binge eating to an overweight and obese sample. Findings support the relevance of cognitive aspects of the model in an overweight and obese sample, and highlight the potential role of early attachment relationships in the formation of cognitions that make an individual vulnerable to overweight and obesity in later life. Theoretical and clinical implications based on the established cognitive model are considered. Limitations include reliance on self-report and the correlational nature of analyses used. Recommendations for future research with larger, more representative samples to address these limitations are made.

Overall, this dissertation makes a unique contribution to the psychological understanding of overweight and obesity, which has the potential to enhance treatment outcomes and suggests useful avenues for further research.

Acknowledgements

I would like to thank my Research Tutor, Dr. Myra Cooper, for her inspiration and support with this research project. I would also like to thank my Research Supervisor's Dr. Alison Griffiths and Dr. Charlie Wykes for all their time, hard work and thoughtful reflections. I am very grateful to Dr. Jane Pollock for her statistical knowledge and guidance, and I would like to thank my fiancé, family and friends for their unrelenting encouragement throughout the last three years.

Finally, I would like to thank the University of Oxford Institute for Clinical Psychology Training for believing in me and giving me the opportunity to pursue a career which I am passionate about, and which I believe I can make a difference in.

May this be just the beginning.

Contents Page

Paper A

Paper B

List of Figures

Paper A

Paper B

List of Tables

Paper A

Paper B

List of Appendices

PAPER A

Towards a developmental understanding of obesity: An Integrative Review

Word Count: 11,644

Abstract

Obesity is an increasing problem, with wide ranging physical, psychological, social and economic consequences. The aetiology of obesity is multifaceted, involving complex interactions between evolutionary, biological, psychological and environmental factors. Whilst psychological theories of obesity have been developed, none are fully adequate in explaining the condition or the empirical evidence that exists. Furthermore, there is currently no effective psychological intervention to help obese individuals lose weight.

This integrative review outlines and critically appraises evidence for key predictions generated by three of the most developed psychological theories of obesity: psychosomatic, psychodynamic and externality theory. Based on these findings, the author draws on relevant literature from the fields of emotion regulation and attachment, and suggests an integration of theoretical constructs to enhance our current understanding of obesity. A novel developmental theory of obesity based on this integration is proposed. Recommendations for future research based on a theoretical framework of emotion regulation are made, and implications for clinical practice, including a focus on enhancing caregiver sensitivity are highlighted.

Key words: *obesity, emotion regulation, attachment*

Proposed Journal: Journal of Eating Behaviour (see Appendix A for submission guidelines)

Towards a developmental understanding of obesity: An Integrative Review

Obesity is one of the most serious public health challenges of the 21st century. Defined as abnormal or excessive fat accumulation that may impair health (World Health Organisation [WHO], 2016), obesity is most commonly measured using the Body Mass Index (BMI). A BMI over 30 is classified as obese whilst a BMI greater than or equal to 25 is defined as overweight (WHO, 2016). The worldwide prevalence of obesity has increased dramatically, with rates having more than doubled since 1980 (WHO, 2016). In England, 27% of adults are currently obese (Barker, 2017), with predictions suggesting that by 2050, 60% of men and 50% of women will be affected (Butland et al., 2007).

Obesity is associated with increased risk of health conditions including cardiovascular disease, diabetes, musculoskeletal disorders and cancer (WHO, 2016). It is also associated with mental health problems including depression and anxiety (Luppino et al., 2010; Gariepy, Nitka, & Schmitz, 2010). As the prevalence of obesity continues to rise, so do the associated costs. In 2016, the annual cost of obesity to the UK, resulting from reduced productivity and increased demands on health and social care services, was estimated at £27billion (Osbourne, 2016). This figure is predicted to reach £50billion in 2050 (Department of Health, 2011) and the prevention and treatment of obesity is, therefore, a national priority (WHO, 2008).

The aetiology of obesity is multifaceted, involving complex interactions between evolutionary, biological, psychological and environmental factors. Whilst medical research continues to reveal the role of genetics, gut bacteria and hormones in explaining obesity (Mark, 2008), little is currently understood about the psychological

factors which might interact with these and contribute to the development and maintenance of obesity over time. Although psychological theories of obesity exist, none are fully adequate in explaining the condition or accounting for the empirical evidence. Importantly, none have led to the development of an effective intervention.

Aims

This integrative review will bring together and critically appraise the empirical evidence for three of the most developed psychological theories of obesity. Based on these findings it will draw on models of emotion regulation (Gross, 2015) and attachment (Bowlby, 1982), and suggest an integration of theoretical constructs that leads to the proposal of a novel developmental theory of obesity. This theory aims to enhance our current understanding and create opportunities for the development of more effective clinical interventions for individuals who are obese.

An integrative review was chosen (as opposed, for example, to a systematic review) as it provides a basis for appraising research findings in relation to existing theoretical models and constructs, thereby assessing the need for further theoretical developments and making relevant recommendations for clinical practice (Kirkevold, 1997). Studies were selected for inclusion following a systematic search of the literature (see Appendix B for summary of search terms used) based on their quality, their relevance to obesity and for the relative knowledge contribution made to the field. The quality of evidence was assessed using established guidance for appraising the quality of empirical research studies (Crombie et al., 1996; Higgins & Green, 2011).

Theories of obesity

Three of the most developed and evidenced theories of obesity are outlined below.

Psychosomatic (Kaplan & Kaplan, 1957)

This theory suggests that obesity is the result of an individual's inability to distinguish feelings of hunger from other emotions. The mechanisms responsible for this are not fully understood, but it is hypothesised that biological and learning factors play a role. Biological factors include the effects of protein and carbohydrate intake on neurotransmitter functioning, which produce physiological incompatibility between the act of eating and the experience of intense emotion, so eating to reduce unpleasant emotions is reinforced over time (Canetti, Bachar, & Berry, 2002).

Psychodynamic (Bruch, 1961; 1973; 1985)

Psychodynamic theory also attributes obesity to an inability to distinguish feelings of hunger from bodily signals of emotional discomfort. However, this inability is the result of experiences in early attachment relationships. According to Bruch (1973), the experience of hunger is not innate but requires learning for proper organisation into recognisable patterns. Negative experiences in the early experiential and interpersonal processes surrounding the satisfaction of nutritional and other bodily needs, means the individual does not successfully learn to label a set of physiological cues as 'hunger' (Canetti, Bachar, & Berry, 2002). This subsequently interferes with the ability to recognise hunger or satiety cues, and to differentiate the urge to eat from other uncomfortable feelings and sensations (the differential sensitivity hypothesis). As in psychosomatic explanations, overeating in response to emotions leads to obesity.

Externality (Schachter et al., 1968; 1971)

Externality theory similarly explains obesity as the result of an inability to recognise internal physiological cues of hunger and satiety. Obese individuals must, therefore, rely on cues from the outside world to know when and how much to eat. The experience of hunger becomes conditioned to a wide range of external influences, and subsequent exposure to a variety of food and non-food related cues leaves the individual vulnerable to overeating, which leads to obesity.

Predictions

Although these theories differ in their explanations of the causal mechanisms that lead to obesity, there are commonalities from which key predictions can be generated and tested. These predictions will now be outlined and the evidence for each will be reviewed and critically appraised.

1. In obese individuals, there will be a disturbance in the experience and regulation of hunger and satiety.
2. Eating in obesity occurs in response to non-hunger related events. This can happen in one of two ways:

a) In response to external cues (externality theory)

b) In response to internal emotions (psychosomatic and psychodynamic theory).

3. Psychosomatic and psychodynamic theories predict that obese individuals are unable to distinguish feelings of hunger from other emotions.

1. In obese individuals, there will be a disturbance in the experience and regulation of hunger and satiety

Hunger, the motivation to seek and consume food (Blundell, 1991) and satiety, the state of being appeased, satisfied or full (Kushner & Pendarvis, 1995) are psychological experiences that determine eating behaviour. Gastric contractions have long been associated with the experience of hunger and satiety (Cannon & Washburn, 1912; Carlson, 1916). Stunkard (1959) and Stunkard and Koch (1964) observed that in healthy-weight individuals there is a high degree of correlation between the experience of gastric contractions and self-reported hunger. However, this association was not found in obese participants. Obese women rarely reported hunger in the presence of gastric contractions, whilst men showed a greater tendency to report hunger in the absence of gastric contractions.

Cabanac and Duclaux (1970) demonstrated that the change in taste sensation which typically occurs from pleasant to unpleasant following a period of eating in healthy-weight individuals did not occur in overweight participants, and a series of experiments have shown that obese participants do not modify their food intake in an experimental task following a pre-load, or reduce the amount eaten in response to experimentally induced anxiety in the way healthy-weight individuals do (Schachter et al., 1968; McKenna, 1972). Taken together, these findings suggest that obese individuals have reduced sensitivity to internal hunger and satiety signals, and supports the hypothesis that there is a disturbance in the experience and regulation of hunger and satiety in this population.

When interpreting these findings, it is important to note that sample sizes of these studies were small, which reduces their statistical power and makes it difficult to generalise from the findings. Additionally, these studies are now relatively old and the criteria used to determine obesity is different to definitions used today. Furthermore, the findings have not consistently been replicated, with one study suggesting that only a sub-group of obese individuals who self-identify as being insensitive to feelings of hunger and fullness demonstrate this experimentally (Barkeling et al., 2007).

In a recent study, Herbert and Pollatos (2014) used a heartbeat detection task to show that obese individuals have significantly reduced ability to perceive and discriminate internal bodily signals more generally (interoceptive sensitivity, IS) compared to healthy-weight controls, with further analysis revealing an inverse correlation between BMI and level of IS, suggesting higher BMI is associated with poorer detection ability. Further studies are needed to determine whether reduced IS is a condition which gives rise to obesity, is a consequence of excessive dietary intake or is associated with a third variable. However, the evidence suggests that reduced internal sensitivity to bodily cues is associated with a disturbance in hunger and satiety regulation, which likely paves the way for the occurrence of non-hunger related eating behaviours outlined in prediction two.

2. Eating in obesity occurs in response to non-hunger related events

This is predicted to occur in one of two ways:

- In response to external cues (externality theory)
- In response to emotions (psychosomatic and psychodynamic theory)

a) Eating in response to external cues

Self-report questionnaire and Ecological Momentary Analysis studies have found significant associations between eating in response to external cues and obesity (Elliston et al., 2016; Schultes et al., 2010). Tuomisto et al. (1998) reported that environmental cues were the most common reason for the initiation of eating behaviour in an obese sample, and there is evidence that obese individuals demonstrate an attention bias towards food cues using eye tracking and modified Stroop task paradigms (Castellanos et al., 2009; Nijs, Franken, & Muris, 2010). Studies show that obese participants salivate more in response to food cues, and display a slower decline in salivary response to the repeated presentation of cues in comparison to healthy weight controls (Epstein, Paluch, & Coleman, 1996; Wooley, Wooley, & Woods, 1975). Higher levels of food craving and disinhibited eating have been observed in obese samples (Delahanty et al., 2002), which is supported by neuroimaging studies showing an over-activation of reward systems in the brains of obese individuals (Scharmuller et al., 2012; Stoeckel et al., 2008; Martin et al., 2010), increased impulsivity and decreased executive function following exposure to food-related cues (Gunstad et al., 2007; Pannacciulli et al., 2006). Finally, the manipulation of food and non-food related cues including the passage of time (Schachter et al., 1968), the taste of food (Nisbett, 1968), the salience of food cues (Ross, 1974), portion size (Nisbett, 1968) and the eating situation (Hashim & Van Itallie, 1965; Goldman, Jaffa, & Schachter, 1968) have all been shown to have a significantly greater influence on the eating behaviour of obese individuals than healthy-weight controls.

However, the literature on external eating in obesity is conflicting, as some studies have failed to find any effect of external cues on the eating behaviour or weight status of obese individuals (e.g. McKenna, 1972; Van Strien & Ouwens, 2003; Van Strien, Herman, & Verheijden, 2009), and others have failed to find significant differences between obese participants and healthy-weight controls in their responsiveness to such cues (Pothos, Tapper, & Calitri., 2009; Sung, Lee, & Song, 2009).

The findings should be considered in light of the limitations of self-report measures, the results of which may be subject to recall and social desirability bias (Herbert et al., 1995). Obese participants may be particularly vulnerable to demand characteristics in experimental studies due to a greater need to be accepted and approved of socially. They may therefore find it difficult to engage in their normal eating behaviours, which could impact the validity of the results obtained (McGee, 1962; Krantz, 1978). Furthermore, most studies have been cross-sectional in design, which precludes drawing inferences about causality. Whilst longitudinal and naturalistic studies begin to offer more convincing evidence of a causal role for external eating contributing to obesity, these studies need to be replicated with larger, more representative samples.

Some authors have proposed that the discrepancies in the literature may be explained by evidence which suggests eating in response to external cues depends more on whether an individual is a restrained or non-restrained eater, than their weight status (Herman & Polivy, 1980; Baucom & Aiken, 1981; Rodin, 1981). Overall, however, eating in response to external cues does seem to occur more in obese individuals than those of healthy-weight.

b) Eating in response to emotions

It has long been understood that the physiological changes produced by emotional arousal mimic the physiological sensations of satiety (Carlson, 1916; Cannon, 1912) and generally therefore leads to a reduction in appetite and decreased eating behaviour (Van Strien & Ouwens, 2003). A growing body of literature suggests however, that some individuals, including the obese, frequently overeat in response to emotional states. This has been termed emotional eating (Bruch, 1973; Heatherton & Baumeister, 1991).

In a study by White (1973) obese participants ate significantly more whilst watching emotionally arousing films than they did watching a neutral film, whilst the eating behaviour of healthy-weight participants was unaffected. Emotional eating assessed using the Dutch Eating Behaviour Questionnaire (Van Strien et al., 1986) has been shown to positively and significantly predict food consumption and level of overweight (Van Strien & Ouwens, 2003; Van Strien, Herman, & Verheijden, 2012). There is strong evidence that obese people engage in significantly more emotional eating than non-obese individuals (Ganley, 1989; Gelibter & Aversa, 2003; McKenna, 1972; Rommel et al., 2012), and that the influence of emotions on eating behaviour is significantly stronger in these groups (Ganley, 1989). The generalisability of these findings is supported by naturalistic studies (Lowe & Fisher, 1982). Slochower, Kaplan, & Mann (1981) found that obese participants ate significantly more during a stressful exam period compared to healthy-weight controls, and that eating was positively related to anxiety level and negatively related to sense of control over feelings.

Emotional eating has been associated with many different emotions in different individuals, but studies consistently show that it is precipitated by negative emotions including anger, depression, boredom, anxiety and loneliness (Canetti et al., 2002). A series of experimental studies (Schachter, Goldman, & Gordon, 1968; McKenna, 1972; Van Strien, 2003) demonstrated that whilst healthy-weight participants reduced their food intake in response to anxiety, obese participants did not, with some obese individuals significantly increasing their consumption.

However, research has not always supported this specific prediction. Abramson and Wunderlich (1972) found no increase in food consumption by obese participants under high versus low anxiety conditions, and Slochower and Kaplan (1980) found that obese participants increased their consumption only when they could not label or control the source of emotional arousal. These discrepancies may, in part, be attributable to the different experimental methodologies used. Schachter, Goldman, & Gordon (1968) and McKenna (1972) induced anxiety by threatening a painful electric shock, whilst Abramson and Wunderlich (1972) attempted to replicate anxiety resulting from emotional conflict by giving negative feedback about performance on an interpersonal questionnaire. Furthermore, artificial mood inductions may not be generalisable to everyday emotional experiences. However, the findings could also be understood within the context of psychodynamic theory, which focuses on the role of diffuse (often unconscious) and uncontrollable internal conflicts in producing the type of anxiety state that leads to overeating (Van Strien, 2003). This anxiety state is difficult to induce and measure experimentally and may not therefore be captured in current

experimental paradigms. Future research might usefully begin to explore this, as well as exploring eating in response to a wider range of both positive and negative emotions.

3. Obese individuals are unable to distinguish hunger and satiety from other emotions

Support for this prediction comes from the studies of Schachter, Goldman and Gordon (1968), McKenna (1972) and Van Strien (2003) previously mentioned, who found that obese participants did not respond to experimental manipulations of hunger and satiety in the same way as healthy-weight participants. Whilst healthy-weight participants ate more when they were food deprived and less when they were anxious, this pattern was not observed in obese participants, who did not significantly modify their food-consumption following a pre-load, and who ate the same amount (or more) when anxiety was experimentally induced. These findings suggest that obese individuals do not recognise or respond to physiological cues of hunger, satiety and emotion in the same way as healthy-weight individuals.

Further evidence for this prediction comes from studies demonstrating that obese individuals have significantly reduced interoceptive awareness (the ability to detect, identify and label feelings or emotions) in comparison to healthy-weight controls. Using the Eating Disorder Inventory (Garner, Olmstead, & Polivy, 1983), Fassino et al. (2004) found that interoceptive awareness (IA) was reduced in all patients with eating disorders, including those with obesity. Two studies have shown that in obese samples, increased BMI predicts lower levels of emotional awareness (reflecting an individual's tendency to attend to and acknowledge emotions) and emotional clarity (the extent to which individuals are clear about the emotions they are

experiencing) using the self-report Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004). Importantly, these deficits were associated with increased non-hunger-related eating behaviours (Gianini, White, & Masheb, 2013; Baldofski et al., 2016).

Alexithymia, a condition characterised by the inability to identify and describe emotions and difficulties differentiating between emotions and bodily sensations (Sifneos, 1996), has been investigated in obese samples using the self-report Toronto Alexithymia Scale (TAS-20) (Parker, Taylor, & Bagby, 1998). Some studies report a higher prevalence of alexithymia in obese compared to healthy-weight individuals (Fukunishi & Kaji, 1997; Elfhag & Lundh, 2007; Zak-Golab et al., 2013), which in turn, is associated with higher levels of non-hunger related eating (Pinna et al., 2011; Da Ros et al., 2011; Noli et al., 2010). However other studies have failed to replicate this finding (Adami et al., 2001; de Zwaan et al., 1993; Morosin & Riva, 1997), or have found higher levels of alexithymia only in a sub-group of obese individuals who present with co-morbid psychopathology (including depression and disordered eating) (Pinna et al., 2011; Da Ros et al., 2011; Noli et al., 2010).

Whilst studies investigating IA in obese populations have generally been of good quality, some methodological limitations should be considered. Firstly, samples differ considerably in terms of their gender, weight, and clinical compositions, so caution must be taken when pooling data and drawing conclusions. Additionally, studies often lacked information about whether potential confounds (such as co-morbid depression, anxiety or other mental health difficulties) were adequately controlled for. Due to the cross-sectional nature of the studies it is not possible to determine causality, and the

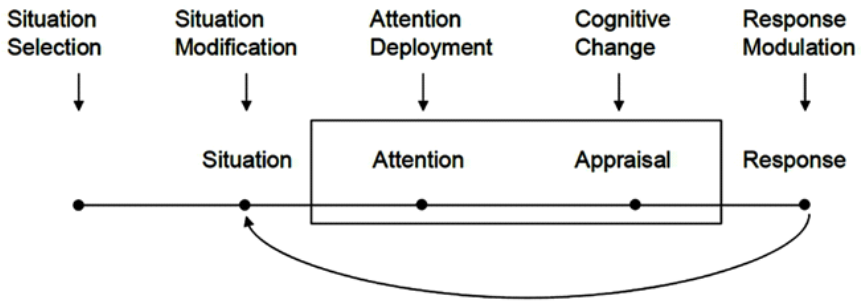
clinical significance of the findings reported was often relatively small. However, the multifactorial nature of obesity means that even small effects are likely to be additive over time, with important long term implications.

Rommel et al. (2012) investigated emotion awareness in an obese sample using the performance based Level of Emotional Awareness Scale (Lane et al., 1990). Results supported previous findings that emotion awareness was reduced in obese individuals compared to healthy-weight controls. However, unexpectedly, level of emotional awareness positively and significantly predicted level of emotional eating. Among obese participants, those who had the highest emotional competencies engaged in more emotional eating. Although this discrepancy may be explained by use of a performance based, rather than self-report measure (the results of the latter potentially being limited in usefulness as it may be deemed paradoxical to ask people who are unaware of emotional states to judge their own level of emotional awareness (Rommel et al., 2012)), it might also suggest that factors other than lack of IA explain emotional eating in obesity. One suggestion that emerges from the literature is that emotional eating is not due to the presence of emotions per se, but a lack of adaptive strategies to manage them (Evers, Stok, & Ridder, 2010: Wiser & Telch, 1999). Consideration of this suggestion leads to a fourth prediction: emotional eating occurs in obesity due to deficits in emotion regulation. This prediction will be reviewed in the next section, after a brief overview of emotion regulation is first presented.

Prediction 4. Obese individuals have deficits in emotion regulation

Emotion regulation has been defined as 'the set of processes whereby people seek to redirect the spontaneous flow of their emotions' (Koole, 2009, p.6), and involves an individual's attempts to influence which emotions they have, when they have them and how they experience or express them (Gross, 1998). The Process Model (Gross, 1998; 2015) is the most widely used and empirically validated model of emotion regulation (Chambers et al., 2009) and is based on the Modal Model of emotion (Gross & Thompson, 2007) which describes emotions as being generated in a sequence of steps (see figure 1).

Figure 1: Basic Process Model of Emotion Regulation (Gross, 1998; 2015)

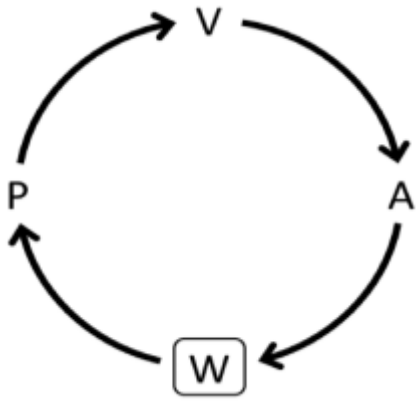


Five broad categories of emotion regulation strategies are outlined. Situation selection strategies involve actions intended to make it more or less likely an individual will be in a situation they expect will give rise to specific emotions. Situation modification strategies involve taking action within a given situation to change its emotional impact. Attention deployment involves purposefully directing attention (e.g. through distraction, concentration or rumination) to influence their emotional response, whilst cognitive change strategies require the modification of one's appraisal of a situation to alter its emotional impact. Response modulation strategies aim to

influence the experiential, behavioural or physiological components of the emotional response after the emotion has been developed.

The model predicts that intervening early on in the emotion generative process will be most effective. In 2015, the model was extended by Gross to better explain how people decide when to regulate emotions and how specific regulation strategies are implemented (Webb, Totterdell, & Ibar, 2015). This helps explain why some people regulate their emotions successfully and others fail. The extended model is based on the notion that all emotions involve a valuation in which an individual discriminates between whether an experience is "indifferent", "good for me" or "bad for me" (see figure 2).

Figure 2: The Valuation Process (Gross, 2015)



In this model, W (world) refers to the internal or external world, whilst P (perception) refers to the perception of a particular valuation system. V (valuation) refers to the comparison made between a representation of the world with a representation of a desired state of the world (the goal or target state). A (action component) refers to the impulses generated by the valuation system which aim to reduce the gap between the

perceived state of the world and the desired state of the world. The concurrent activation of multiple valuation systems leads systems to interact with each other. Sometimes systems are mutually supportive whilst at other times they compete, and another valuation system may be called in to resolve the situation. According to the extended process model, emotion regulation occurs when one value system (referred to as the second level value system) takes another value system (referred to as the first level value system, the one generating the emotion) as a target, evaluates it (either positively or negatively such that there is a discrepancy between P and what one would like W to be like) and activates action impulses intended to modify activity in the first level valuation system.

The extended model divides the emotion regulation process into three separate valuation systems corresponding to stages of the emotion regulation cycle. The identification stage involves a valuation of whether to regulate an emotion. The selection stage involves the selection of a particular emotion regulation strategy and the implementation stage involves translating that strategy into action. Within each stage a perceptual, valuation and action sub step influence the regulation outcome and a number of regulation processes including maintenance, switching and stopping explain how regulation is maintained over time. The model emphasises that sequences and blends of strategies are required for effective emotion regulation, with people being flexible and able to make adjustments depending on their context and goals in a particular situation.

Research has shown that obese individuals have reduced emotion regulation ability in comparison to healthy-weight controls (Zijlstra et al., 2012). This reduced

ability has, in turn, been associated with higher levels of emotional eating, eating in the absence of hunger and general eating pathology in obese populations (Gianini, White, & Masheb, 2013; Baldofski et al., 2016). The literature on specific emotion regulation processes in obesity is currently very limited and research has not yet been based on an existing theoretical framework.

Identification stage

The evidence reviewed in support of the prediction that obese individuals have reduced ability to detect, identify and label emotions suggests that regulation may fail as early on as the identification stage.

Selection stage

Baldofski et al. (2016) and Gianini, White, & Masheb (2013) reported that obese individuals had low scores on the 'access to emotion regulation strategies' subscale of the DERS, reflecting the belief that little can be done to regulate emotions once upset. Moreover, the strength of this belief was positively associated with BMI, level of emotional eating and eating in the absence of hunger and may therefore suggest emotion regulation failure also occurs at the selection stage.

Implementation stage

Evidence that failure may occur at the implementation stage comes from findings that obese individuals score highly on the 'difficulty engaging in goal directed behaviour subscale' of the DERS, reflecting difficulty concentrating and accomplishing

tasks when experiencing negative emotions (Gianini, White, & Masheb, 2013; Baldofski et al., 2016). Higher scores were associated with increased BMI, higher levels of emotional eating (Baldofski et al., 2016) and general eating pathology (Gianini, White, & Masheb, 2013).

Although these studies begin to suggest areas of emotion regulation that are impaired in obese people, it is important to note that no research has yet compared this ability to that of healthy-weight controls and it is therefore not possible to know whether such an impairment is unique to this group. Further research is also needed to determine whether these findings generalise to obese males and females without Binge Eating Disorder and who are not undergoing bariatric surgery.

Given the evidence presented in support of the prediction that obese individuals eat in response to emotions, emotion regulation seems an important area for future research. Gross' (2015) process model may provide a useful framework from which to explore regulation processes in more detail. Determining at what stages emotion regulation might fail in obese people may lead to new targets for intervention. For example, if an individual's beliefs about their ability to change their emotional state leads to regulation failure at the action sub-step, then self-efficacy may be a useful target. If research shows that obese individuals have a limited repertoire of regulation strategies available to them at the selection stage, therapies such as Dialectical Behavioural Therapy (DBT) (Linehan, 1993) might usefully be drawn upon to increase these. Alternatively, challenging positive beliefs about the use of maladaptive strategies

(such as emotional eating), which influence decisions at the valuation sub-step may need to be addressed.

These findings raise a further important question: why are some individuals (and not others) vulnerable to emotional eating that leads to obesity? Emotion regulation abilities develop over time within the context of the early attachment relationship (Cooper & Warren, 2011). Research has shown that negative early experiences with caregivers may result in the development of an insecure attachment style, which has been linked to difficulties with emotion regulation (Shaver & Mikulincer, 2007). This leads to a fifth prediction: that obese individuals will have differences in their attachment style. The evidence for this prediction will now be reviewed.

Prediction 5. Obese individuals have differences in their attachment style

Attachment theory explains how early interactions between a child and their primary caregiver lead to the formation of enduring beliefs and expectations about the self and others (internal working models, IWM's) which affect later emotional and behavioural regulation and interactions within interpersonal relationships (Bowlby, 1982). Four categories of attachment style have been observed, each of which reflects a different quality of early attachment experience (Bartholomew & Horowitz, 1991; Griffin & Bartholomew, 1994; Ainsworth, 1979). A secure attachment develops when a primary caregiver is sufficiently attuned and responsive to their child's needs. The child learns they can depend on their caregiver to provide a secure base from which to learn about and explore the world. Through repeated reciprocal interactions, caregivers

provide emotional support and feedback to the child who then develops strategies for managing increasing levels of emotional arousal (Solomon, Dillard, & Anderson, 2002). A secure attachment style is associated with healthier outcomes in adult life, including the ability to use a broad range of coping strategies in times of stress (Maunder & Hunter, 2001).

If a caregiver is unable to consistently respond to their child's needs or make them feel safe then an insecure attachment style may develop (Shaver & Mikulincer, 2007). Anxiously attached individuals tend to be concerned about rejection and abandonment by their caregiver. They are often hyper-vigilant to threat and experience heightened levels of distress (Shaver & Mikulincer, 2007). To cope with their anxiety these individuals employ strategies designed to re-establish proximity and seek reassurance. Avoidantly attached individuals on the other hand, tend to reject the importance of emotion or reliance on other people and avoid or suppress feelings in order to cope (Gillath, Giesbrecht, & Shaver, 2009). In both cases the individual has not developed skills which enable them to successfully regulate their emotions internally, and are therefore more likely to turn to external means to do so, such as eating. A disorganised attachment style occurs when an individual lacks a coherent strategy for responding to their attachment figure and is often associated with early experiences of trauma or abuse (Hesse & Main, 2000). A disorganised attachment style is a strong risk factor for maladaptive self-regulation strategies in later life (Solomon & George, 1999).

Three studies have shown that an insecure attachment style in parents is significantly associated with overweight and obesity in their children (Mazzeschi et al., 2014; Trombini et al., 2003; Stenhammar et al., 2010). This has been found for both

mothers and fathers, using a range of self-report and interview/performance based measures, in clinical and community samples.

A link between insecure attachment, particularly an anxious attachment style, and a range of eating related outcomes has also been found in adults. Wilkinson et al. (2010) reported a significant association between attachment anxiety and higher than average BMI in a community sample including obese students. This association was mediated by a pattern of disinhibited eating (failure to restrict food intake and overeat). Taube-Schiff et al. (2015) observed an association between attachment anxiety and higher levels of emotional eating in a sample of 1393 bariatric surgery candidates. Interestingly, meditation analysis revealed this association could be explained by deficits in emotion regulation. Aarts et al. (2015) found that attachment anxiety predicted poor dietary adherence and lower levels of weight loss in a group of 105 obese patients following bariatric surgery. The influence of attachment style in relation to the experience of specific emotions has been further explored by Taube-Schiff et al. (2015), who observed that anxious attachment was associated with increased eating behaviour in response to anger, whilst avoidant attachment was associated with increased eating in response to anxiety. This may be a fruitful area for further investigation.

Overall, studies have shown that an insecure attachment is associated with a significantly higher prevalence of obesity, and this association extends from early childhood through to adolescence (Anderson & Whitaker, 2011; Anderson et al., 2012; Keitel-Korndorfer et al., 2015; Bahrami et al., 2013). Anderson (2011; 2012) highlights the importance of maternal sensitivity in increasing the risk for obesity, and Bahrami et

al. (2013) adds cultural validity to the literature by demonstrating that the quality of a child's attachment had a significant effect on obesity risk in a population of 202 obese students from the Middle East and North Africa.

Bosmans, Goossens and Braet (2009) measured children's attachment to both their mother and father using the Relationship Questionnaire (Bartholomew & Horowitz, 1991), which revealed an association between poor attachment and the presence of weight and shape concerns. This finding may go some way to explaining how an insecure attachment style leads to the formation of cognitions known to be risk factors for the development of maladaptive eating behaviours.

In summary, these findings support the prediction that obese individuals have differences in their attachment style. An insecure attachment style has been associated with overweight and obesity, with further evidence suggesting this association is mediated by deficits in emotion regulation which influence eating related outcomes.

Although these studies are generally of good quality, it is important to note that attachment measures used varied significantly between studies. Some studies measured attachment globally, whereas others measured it specifically, and studies varied further in to whom attachment was measured towards, all of which may influence the strength of the associations found. Anderson et al. (2012), who found different results using the same population, highlighted that different attachment tools are designed to measure different things (for example, the ability of a parent to provide a safe base versus an individual's IWM of interpersonal relationships) and caution should therefore be exercised when pooling data and drawing overall conclusions. Mazzeschi (2014) criticized studies which rely solely on self-report measures of

attachment, as eliciting an individual's conscious appraisal of themselves within an attachment relationship provides little information about the influence of their unconscious IWM. However, observational measures also leave open the question of whether laboratory based interactions are truly representative of typical behaviour. Researchers should consider carefully which aspects of attachment, and to whom, are important to assess. Future studies should be explicit in describing the measure of attachment used and continue to use a range of self-report and objective measures, with follow-up studies to establish the long-term implications of these findings. Overall, given that studies using a broad range of well validated measures have drawn similar conclusions emphasises the importance of considering attachment style and its corollaries, such as maternal sensitivity, in future research on obesity.

Thus far, the literature has paid little attention to why obese individuals turn to food to regulate their emotions (rather than other behaviours such as self-harm). The key to answering this may emerge through the consideration of early feeding experiences. Early theories (Bruch, 1961; Ambrose, 1969) implicate feeding in the development of hunger, satiety and emotion regulation abilities. Feeding is the first place the infant learns reciprocal patterns of interaction, and how their behaviour can influence others. Evidence suggests a feeding style which allows infants to be active participants in determining the timing of feeding, amount of food ingested and pace of intake is most likely to promote the optimal development of feedback mechanisms which regulate normal feeding behaviour (Ambrose, 1969). Consideration of this literature leads to the final prediction of this review: that obese individuals will have differences in their early feeding patterns.

Prediction 6. Obese individuals have differences in their early feeding patterns

Large scale epidemiological studies and meta-analyses have concluded that breastfeeding is associated with reduced risk of developing overweight or obesity in childhood, adolescence and adulthood (Hassiotou & Geddes, 2014; Arenz et al., 2004; Harder et al., 2005). Further evidence suggests that breastfeeding is associated with enhanced hunger and satiety regulation ability in infants (Hassiotou, 2014; Dewey & Lonnerdal, 1983; Di Santis et al., 2011; Li et al., 2014). Both physiological (e.g. the composition of protein and appetite hormones in milk) and behavioural mechanisms (patterns and interactions of feeding) have been proposed to explain this association, although it is most likely that the combined interactions and effects of both affect risk of obesity (Bartok & Ventura, 2009).

Behavioral explanations emphasise the importance of the mother's sensitivity to infant cues (DiSantis et al., 2011). Breastfeeding mothers do not know how much milk is being offered or the rate at which the infant is drinking, and mothers must therefore focus on the infant's hunger or satiety cues to know when to start and stop feeding. Bottle feeding on the other hand, provides explicit visual information about intake and parents may be less attuned to recognising the infant's needs and may encourage bottle-emptying (Di Santis et al., 2011). Such over-feeding may inadvertently override the infant's natural hunger and satiety signals and reduce their ability to self-regulate, with lasting implications (Birch & Fisher, 1995). The limitations of research in this area are that, given the complex nature of breastfeeding, the associations found could be the result of residual confounding factors such as parental attributes or the family

environment. However, some studies which have attempted to control for these factors still report significant associations (Dewey, 2003).

Importantly, feeding involves more than just controlling food intake, as interactions involving eye gaze, soothing touch and oxytocin flow also influence the developing attachment relationship (Schore, 2005). Early feeding interactions that lead to the development of mutually gratifying reciprocal rhythms are more likely to facilitate the development of a secure attachment relationship. Drawing on findings presented by Anderson and Whitaker (2011) and Anderson et al., (2012), what seems key within the early feeding experience is caregiver sensitivity; the ability of a caregiver to be attuned to an infant's needs and to respond appropriately.

Integration of theories and evidence

The next section of the review will use Gross' (2015) extended model of emotion regulation as a framework to understand how the evidence presented in this review may explain emotion regulation failures that, in turn, contribute to the development and maintenance of obesity. It will also consider how these failures may be explained by a lack of caregiver sensitivity, particularly within the early feeding relationship. From this integration of theory and evidence, a novel developmental model of obesity will be proposed.

As has previously been described, the extended process model of emotion regulation (Gross, 2015) is divided into three separate valuation stages, each of which further comprises a perceptual, valuation and action sub-step. A description of each stage is given in in Table 1.

Table 1: Description of the extended process model (Gross, 2015)

Identification stage	**Involves a decision about whether or not to regulate an emotion**
Perceptual sub-step	Involves accurately perceiving and discriminating emotions
Valuation sub-step	Involves a decision about whether or not the emotion needs to be regulated based on past experience
Action sub-step	Involves generating action impulses intended to modify the emotion at the selection stage
Selection stage	**Involves a decision about which emotion regulation strategy to use**
Perceptual sub-step	Involves the perception of a range of available emotion regulation strategies
Valuation sub-step	Involves a decision about which regulation strategy is most appropriate based on past experience
Action sub-step	Involves generating action impulses intended to implement the strategy
Implementation stage	**Involves translating the chosen regulation strategy into action**
Perceptual sub-step	Involves perceiving how to apply the regulation strategy within a particular situation, based on past experience
Valuation sub-step	Involves a decision about how effective the strategy is
Action sub-step	Involves taking action intended to continue regulation, change strategy, or stop regulation.

Identification stage

Evidence that obese individuals have reduced ability to perceive, label and discriminate feelings of hunger, satiety and emotion may lead to failure occurring as early on as the perceptual sub-step of the identification stage. This ability develops as sensitive caregivers recognise, mirror and label an infant's experiences and hand them back to the infant in a manageable way (Fonagy, 2004). Regulation may also fail at the valuation sub-step of the identification stage, because individuals who have experienced low levels of caregiver sensitivity may not perceive any value in regulating their emotions. For example, individuals with an anxious attachment style often exaggerate emotional responses to get their attachment needs met (Shaver & Mikulincer, 2007). Failure to perceive emotions or the need to regulate these, may inhibit the generation of impulses at the action sub-step of the identification stage.

Selection stage

An infant develops emotion regulation abilities through repeated patterns of reciprocal action with sensitive and attuned caregivers (Fonagy, 2004). If a caregiver is unable to provide this, the individual may perceive a limited range of effective regulation strategies to be available to them, leading to failure occurring at the perception sub-step of the selection stage.

Low levels of caregiver sensitivity may also mean that all indications of an infant's need were responded to by feeding. Through reinforcement, the infant may come to associate the experience of eating with reducing unwanted experiences, which may lead to the overvaluation of eating as an effective regulation strategy at the

valuation sub-step of the selection stage. The discrepancy experienced between an individual's signals for need, and their needs being appropriately and adequately met, may additionally lead to low self-efficacy and self-confidence, which may impair the learning and development of alternative regulation abilities. Through these mechanisms, a lasting pre-disposition to select eating at the action sub-step of the selection stage may be created, which, over time, may contribute to obesity.

Implementation stage

A relative lack of adaptive regulation strategies, alongside low levels of regulation self-efficacy may impair an individual's ability to apply emotion regulation strategies flexibly, across a range of settings, with different emotions. This may result in regulation failure, particularly in novel situations, occurring at the perceptual, valuation and implementation sub-steps of the implementation stage.

Failure to regulate emotions using internal strategies may additionally explain evidence that obese individuals are more likely to eat in response to external cues. Infants who experience low levels of caregiver sensitivity must become more alert to external cues (rather than developing internal cues) to signal feeding. Over time, eating becomes conditioned to a wide range of stimuli, particularly in an environment where access to highly palatable and rewarding foods are readily available, reinforcing such eating behaviours.

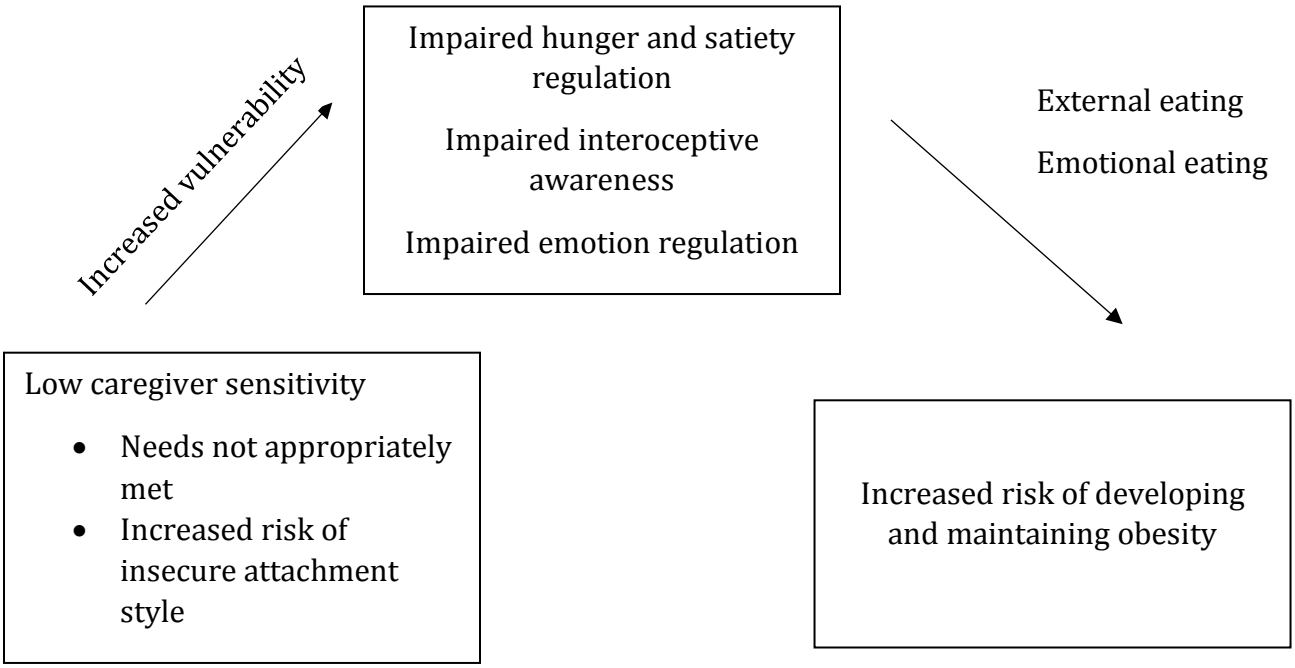
Differences observed in the attachment styles of obese individuals also highlights the importance of caregiver sensitivity, as this is required at a good enough level for the development of a secure attachment relationship (Bowlby, 1982). Through

early interactions with their caregiver, an infant begins to form an understanding about themselves, the world, and how they can expect others to respond. This representation is carried with them throughout their lives as an IWM. Although IWM's can be modified, early experiences are particularly influential as they provide a lens through which all subsequent experiences are perceived (Ainsworth, 1979). If a caregiver is not sufficiently attuned to an infant's needs, an insecure attachment style is more likely to develop. This, in turn, is associated with higher and more frequent levels of distress (Shaver & Mikuliner, 2007) which may be a perpetuating factor in the development of obesity.

A proposed developmental model of obesity

The integration of theory and evidence presented in this review enhances our understanding of the psychological factors that may contribute to the development and maintenance of obesity. It leads to the consideration of a novel developmental model of obesity, which may be most usefully conceptualised as a stress vulnerability framework. In this model, low caregiver sensitivity, particularly within the early feeding relationship, is a vulnerability factor for the development of an insecure attachment style, and, relatedly, poor emotion regulation abilities. These deficits in emotion regulation serve to maintain maladaptive eating behaviours (such as emotional and external eating) which contribute to increased risk of developing obesity over time. This model is presented diagrammatically in figure 3.

Figure 3: Proposed developmental model of obesity



Therefore, with levels of caregiver sensitivity being on a continuum, very poor levels may lead an infant to engage in maladaptive eating behaviours from an early age, leading to childhood obesity that is continued into adulthood via their IWM. Other individuals, may, however, experience sufficient caregiver sensitivity that enables them to continue through life without ever developing obesity, if they do not encounter sufficient levels of stress. It may also be the case that securely attached individuals develop obesity and further research is required to test this theory.

This proposed developmental model of obesity is not intended to be a deterministic one. Additionally, it is important to acknowledge that this model focuses solely on the psychological experiences associated with obesity, and further work is required to integrate these findings with research from other areas known to influence

the development of obesity such as an individual's genetic predispositions, the obesogenic environment, socio-economic and interpersonal factors. Obesity is a complex condition with multiple aetiologies and trajectories, and this model is likely therefore to be just one explanation that may be useful for a particular group of obese individuals. However, it is hoped that this understanding may lead to the consideration of further clinical and research implications.

Implications

Clinical

At the individual level, interventions designed to help obese individuals recognise and therefore discriminate between sensations of hunger, satiety and emotions may reduce non-hunger related eating. For example, using mindfulness interventions which have been shown to be effective in increasing awareness of bodily sensations associated with the experience of hunger and other emotions (Kristeller & Wolver, 2010). Existing therapeutic approaches, such as DBT (Linehan, 1993), might also usefully be drawn upon to support obese individuals develop and flexibly apply a range of alternative emotion regulation strategies. Challenging positive beliefs that lead to the overvaluation of eating as an effective regulation strategy using cognitive behavioural methods may further reduce the disposition towards emotional eating. Supporting individuals to apply newly-developed regulation strategies across a range of settings, with a range of emotions (for example, using behavioural experiments) may increase self-efficacy and further reduce the tendency of individuals to turn to food in times of distress. Evidence that obese individuals are more responsive to external cues

additionally highlights the need for interventions at a policy level, to tackle the current obesogenic environment by reducing the salience and ease of access to energy dense foods.

Importantly, the model has clear implications for efforts aimed at the prevention of obesity. Prevention interventions could usefully focus on enhancing caregiver sensitivity to their infants cues. Existing approaches informed by attachment theory such as Mentalisation Based Therapy (Fonagy, 2004) could be used to support caregivers accurately recognise and respond to their infant's needs, thus supporting the development of healthy hunger, satiety and emotion regulation in later life. It may be beneficial to identify caregivers who themselves have an insecure attachment style, as they may not possess the IWM required to develop a secure attachment with their infant. Providing early intervention for this group might provide an opportunity to break the intergenerational transmission of obesity which is frequently observed.

Research

The review has highlighted the need to integrate literature from existing psychological theories of obesity with theories of emotion regulation and attachment, to better understand the psychological factors associated with the development and maintenance of obesity. It has recommended further research on emotion regulation in obesity, with Gross' (2015) extended model as a suggested theoretical framework. It may be useful to investigate which regulation strategies are most commonly used by obese individuals, and to understand where regulation processes fail in comparison to

healthy-weight individuals, as this may inform the development of more effective psychological interventions.

Future research could usefully explore whether the findings highlighted in this review represent a small subsection of obese individuals to which the proposed model could be relevant, or whether insecure attachment is the norm in obese populations. Larger, longitudinal studies with more representative samples should also continue to explore the relationship between attachment style, emotion and eating behaviour as this may facilitate novel, individualised interventions.

An important area to consider next will be how these findings fit in with what we know about the role of cognitions in obesity. Negative self-beliefs are also thought to develop in the context of early attachment relationships, and preliminary evidence suggests that these may mediate the relationship observed between attachment and obesity (Cooper & Young, 2015).

Summary

The evidence for three psychological theories of obesity has been reviewed and critically appraised. Based on these findings, literature on emotion regulation and attachment in obesity has been reviewed. Gross' (2015) model of emotion regulation has been used to integrate the theory and evidence presented, and a novel developmental theory of obesity based on this integration has been proposed. It is hoped that this model may enhance our current understanding of obesity and lead to the development of more effective psychological interventions for obese individuals.

References

Aarts, F., Geenen, R., Gerdes, V. E., van de Laar, A., Brandjes, D. P., & Hinnen, C. (2015). Attachment anxiety predicts poor adherence to dietary recommendations: an indirect effect on weight change 1 year after gastric bypass surgery. *Obesity Surgery*, *25*, 666-672.

Abramson, E. E., & Wunderlich, R. A. (1972). Anxiety, fear and eating: A test of the psychosomatic concept of obesity. *Journal of Abnormal Psychology*, *79*, 317-321.

Adami, G., Campostano, A., Ravera, G., Leggieri, M., & Scopinaro, N. (2001). Alexithymia and body weight in obese patients. *Behavioral Medicine*, *27*, 121-126.

Ainsworth, M. S. (1979). Infant–mother attachment. *American Psychologist*, *34*, 932-937.

Ambrose, A. (1969). *Stimulation in early infancy*. Oxford: England.

Anderson, S. E., Gooze, R. A., Lemeshow, S., & Whitaker, R. C. (2012). Quality of early maternal–child relationship and risk of adolescent obesity. *Pediatrics, 129,* 132-140.

Anderson, S. E., & Whitaker, R. C. (2011). Attachment security and obesity in US preschool-aged children. *Archives of Pediatrics & Adolescent Medicine*, *165*, 235-242.

Arenz, S., Rückerl, R., Koletzko, B., & von Kries, R. (2004). Breast-feeding and childhood obesity—a systematic review. *International Journal of Obesity*, *28*, 1247-1256.

Bahrami, F., Kelishadi, R., Jafari, N., Kaveh, Z., & Isanejad, O. (2013). Association of children's obesity with the quality of parental–child attachment and psychological variables. *Acta Paediatrica*, *10*, 321-324.

Baldofski, S., Rudolph, A., Tigges, W., Herbig, B., Jurowich, C., Kaiser, S., & Hilbert, A. (2016). Weight bias internalization, emotion dysregulation, and non-normative eating behaviors in prebariatric patients. *International Journal of Eating Disorders*, *49*, 180-185.

Barkeling, B., King, N. A., Näslund, E., & Blundell, J. E. (2007). Characterization of obese individuals who claim to detect no relationship between their eating pattern and sensations of hunger or fullness. *International Journal of Obesity*, *31*, 435-439.

Barker, C. (2017). Obesity Statistics. *Briefing paper no. 3336*. House of Commons Library. Retrieved from http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN03336#fullreport.

Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: a test of a four-category model. *Journal of Personality and Social Psychology*, *61*, 226-244.

Bartok, C. J., & Ventura, A. K. (2009). Mechanisms underlying the association between breastfeeding and obesity. *International Journal of Pediatric Obesity*, *4*, 196-204.

Baucom, D. H., & Aiken, P. A. (1981). Effect of depressed mood on eating among obese and nonobese dieting and nondieting persons. *Journal of Personality and Social Psychology*, *41*, 577-585.

Birch, L. L., & Fisher, J. A. (1995). Appetite and eating behavior in children. *Pediatric Clinics of North America*, *42*, 931-953.

Blundell, J. (1991). Pharmacological approaches to appetite suppression. *Trends in Pharmacological Sciences*, *12*, 147-157.

Bosmans, G., Goossens, L., & Braet, C. (2009). Attachment and weight and shape concerns in inpatient overweight youngsters. *Appetite*, *53*, 454-456.

Bowlby, J. (1982). Attachment and loss: Retrospect and prospect. *American Journal of Orthopsychiatry*, *52*, 664-678.

Bruch, H. (1961). Transformation of oral impulses in eating disorders: A conceptual approach. *Psychiatric Quarterly*, *35*, 458-481.

Bruch, H. (1973). *Eating Disorders.* New York: Basic Books.

Bruch, H. (1985). Four decades of eating disorders. In D. M. Garner., & P. E. Garfinkel (Eds.). *Handbook of Psychotherapy for Anorexia Nervosa and Bulimia*. New York: Guilford Press.

Butland, B., Jebb, S., Kopelman, P., McPherson, K., Thomas, S., Mardell, J., & Parry, V. (2007). *Tackling obesities: future choices-project report*. London: Department of Innovation, Universities and Skills. Retrieved from http://www.safefood.eu/SafeFood/media/SafeFoodLibrary/Documents/Professional/All-island%20Obesity%20Action%20Forum/foresight-report-full_1.pdf.

Cabanac. M,. & Duclaux. R. (1970). Obesity: Absence of Satiety Aversion to Sucrose. *Science, 168*, 496-497.

Canetti, L., Bachar, E., & Berry, E. M. (2002). Food and emotion. *Behavioural Processes*, *60*, 157-164.

Cannon, W. B., & Washburn, A. L. (1912). An explanation of hunger. *American Journal of Physiology-Legacy Content*, *29*, 441-454.

Carlson, A. J. (1916). The Control of Hunger in Health and Disease. *American Journal of Public Health, 6,* 1240.

Castellanos, E. H., Charboneau, E., Dietrich, M. S., Park, S., Bradley, B. P., Mogg, K., & Cowan, R. L. (2009). Obese adults have visual attention bias for food cue images: evidence for altered reward system function. *International Journal of Obesity*, *33*, 1063-1073.

Chambers, R., Gullone, E., & Allen, N. B. (2009). Mindful emotion regulation: An integrative review. *Clinical Psychology Review*, *29*, 560-572.

Cooper, M. J., & Warren, L. (2011). The relationship between body weight (body mass index) and attachment history in young women. *Eating Behaviors*, *12*, 94-96.

Cooper, M. J., & Young, E. (2015). Parental Bonding and Body Mass Index in a Female Community Sample: The Mediating Role of Eating Disorder Thoughts and Core Beliefs. *Behavioural and Cognitive Psychotherapy*, *44*, 1-5.

Crombie, I. K. (1996). *The pocket guide to critical appraisal.* London: BMJ Publishing Group.

Da Ros, A., Vinai, P., Gentile, N., Forza, G., & Cardetti, S. (2011). Evaluation of alexithymia and depression in severe obese patients not affected by eating disorders. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *16*, 24-29.

Delahanty, L. M., Meigs, J. B., Hayden, D., Williamson, D. A., & Nathan, D. M. (2002). Psychological and behavioral correlates of baseline BMI in the diabetes prevention program (DPP). *Diabetes Care*, *25*, 1992-1998.

Department of Health. (2011). *Obesity General Information*. London: Department of Health.

Dewey, K. G. (2003). Is breastfeeding protective against child obesity? *Journal of Human Lactation*, *19*, 9-18.

Dewey, K. G., & Lönnerdal, B. (1983). Milk and nutrient intake of breast-fed infants from 1 to 6 months: relation to growth and fatness. *Journal of Pediatric Gastroenterology and Nutrition*, *2*, 497-506.

De Zwaan, M., Mitchell, J. E., Seim, H. C., Specker, S. M., Pyle, R. L., Raymond, N. C., & Crosby, R. B. (1994). Eating related and general psychopathology in obese females with binge eating disorder. *International Journal of Eating Disorders*, *15*, 43-52.

DiSantis, K. I., Hodges, E. A., Johnson, S. L., & Fisher, J. O. (2011). The role of responsive feeding in overweight during infancy and toddlerhood: a systematic review. *International Journal of Obesity*, *35*, 480-492.

Elfhag, K., & Lundh, L. G. (2007). TAS-20 alexithymia in obesity, and its links to personality. *Scandinavian Journal of Psychology*, *48*, 391-398.

Elliston, K. G., Ferguson, S. G., Schüz, N., & Schüz, B. (2016). Situational Cues and Momentary Food Environment Predict Everyday Eating Behavior in Adults With Overweight and Obesity. *Health Psychology, 36,* 337-345.

Epstein, L. H., Paluch, R., & Coleman, K. J. (1996). Differences in salivation to repeated food cues in obese and nonobese women. *Psychosomatic Medicine*, *58*, 160-164.

Evers, C., Stok, F., & de Ridder, D. T. (2010). Feeding your feelings: Emotion regulation strategies and emotional eating. *Personality and Social Psychology Bulletin*, *36*, 792-804.

Fassino, S., Pierò, A., Gramaglia, C., & Abbate-Daga, G. (2004). Clinical, psychopathological and personality correlates of interoceptive awareness in anorexia nervosa, bulimia nervosa and obesity. *Psychopathology*, *37*, 168-174.

Fonagy, P. (2004). In Gergely G., Jurist E. L. (Eds.), *Affect regulation, mentalization and the development of the self*. London: Karnac Books.

Fukunishi, I., & Kaji, N. (1997). Externally oriented thinking of obese men and women. *Psychological Reports*, *80*, 219-224.

Ganley, R. M. (1989). Emotion and eating in obesity: A review of the literature. *International Journal of Eating Disorders*, *8*, 343-361.

Gariepy, G., Nitka, D., & Schmitz, N. (2010). The association between obesity and anxiety disorders in the population: a systematic review and meta-analysis. *International Journal of Obesity, 34*, 407-419.

Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, *2*, 15-34.

Geliebter, A., & Aversa, A. (2003). Emotional eating in overweight, normal weight, and underweight individuals. *Eating Behaviors*, *3*, 341-347.

Gianini, L. M., White, M. A., & Masheb, R. M. (2013). Eating pathology, emotion regulation, and emotional overeating in obese adults with binge eating disorder. *Eating Behaviors*, *14*, 309-313.

Gillath, O., Giesbrecht, B., & Shaver, P. R. (2009). Attachment, attention, and cognitive control: Attachment style and performance on general attention tasks. *Journal of Experimental Social Psychology*, *45*, 647-654.

Goldman, R., Jaffa, M., & Schachter, S. (1968). Yom Kippur, Air France, dormitory food, and the eating behavior of obese and normal persons. *Journal of Personality and Social Psychology*, *10*, 117-123.

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, *26*, 41-54.

Griffin, D. W., & Bartholomew, K. (1994). Models of the self and other: Fundamental dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology*, *67*, 430-445.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, *2*, 271-299.

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry*, *26*, 1-26.

Gross, J. J., & Thompson, R. A. (2007). Emotion regulation: Conceptual foundations. In Gross, J (Ed.). *Handbook of emotion regulation*. New York; London: Guildford Press.

Gunstad, J., Paul, R. H., Cohen, R. A., Tate, D. F., Spitznagel, M. B., & Gordon, E. (2007). Elevated body mass index is associated with executive dysfunction in otherwise healthy adults. *Comprehensive Psychiatry*, *48*, 57-61.

Harder, T., Bergmann, R., Kallischnigg, G., & Plagemann, A. (2005). Duration of breastfeeding and risk of overweight: a meta-analysis. *American Journal of Epidemiology, 162,* 397-403.

Hashim, S. A., & Van Itallie, T. B. (1965). Studies in normal and obese subjects with a monitored food dispensing device. *Annals of the New York Academy of Sciences*, *131*, 654-661.

Hassiotou, F., & Geddes, D. T. (2014). Programming of appetite control during breastfeeding as a preventative strategy against the obesity epidemic. *Journal of Human Lactation*, *30*, 136-142.

Hays, N. P., & Roberts, S. B. (2008). Aspects of eating behaviors "disinhibition" and "restraint" are related to weight gain and BMI in women. *Obesity*, *16*, 52-58.

Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, *110*, 86-108.

Hebert, J. R., Clemow, L., Pbert, L., Ockene, I. S., & Ockene, J. K. (1995). Social desirability bias in dietary self-report may compromise the validity of dietary intake measures. *International Journal of Epidemiology*, *24*, 389-398.

Herbert, B. M., & Pollatos, O. (2014). Attenuated interoceptive sensitivity in overweight and obese individuals. *Eating Behaviors*, *15*, 445-448.

Herman, C. P., & Polivy, J. (1980). Restrained eating. In A. J. Stunkard (Ed.), *Obesity* (pp. 208-225). Philadelphia, PA: Saunders.

Hesse, E., & Main, M. (2000). Disorganized infant, child, and adult attachment: Collapse in behavioral and attentional strategies. *Journal of the American Psychoanalytic Association*, *48*, 1097-1127.

Higgins, J. P. T., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions (*Vol. 4). John Wiley & Sons.

Kaplan, H., & Kaplan, H. (1957). The psychosomatic concept of obesity. *Journal of Nervous and Mental Disease, 125,* 181-201.

Keitel-Korndörfer, A., Sierau, S., Klein, A. M., Bergmann, S., Grube, M., & von Klitzing, K. (2015). Insatiable insecurity: maternal obesity as a risk factor for mother–child attachment and child weight. *Attachment & Human Development*, *17*, 399-413.

Kirkevold. M. (1997). Integrative nursing research: an important strategy to further the development of nursing science and nursing practice. *Journal of Advanced Nursing, 25*, 977–984.

Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition and Emotion*, *23*, 4-41.

Krantz, D. S. (1978). The social context of obesity research: Another perspective on its place in the field of social psychology. *Personality and Social Psychology Bulletin*, *4*, 177-184.

Kristeller, J. L., & Wolever, R. Q. (2010). Mindfulness-based eating awareness training for treating binge eating disorder: the conceptual foundation. *Eating Disorders*, *19*, 49-61.

Kushner, R., & Pendarvis, L. (1995). Appetite regulation, obesity, and eating disorders. *Current Opinion in Gastroenterology*, *11*, 179-185.

Lane, R. D., Quinlan, D. M., Schwartz, G. E., Walker, P. A., & Zeitlin, S. B. (1990). The Levels of Emotional Awareness Scale: A cognitive-developmental measure of emotion. *Journal of Personality Assessment*, *55*, 124-134.

Li, R., Scanlon, K. S., May, A., Rose, C., & Birch, L. (2014). Bottle-feeding practices during early infancy and eating behaviors at 6 years of age. *Pediatrics*, *134*, 70-77.

Linehan, M. M. (1993). Dialectical behavior therapy for treatment of borderline personality disorder: implications for the treatment of substance abuse. *NIDA Research Monograph*, *137*, 201-201.

Lowe, M. R., & Fisher Jr, E. B. (1983). Emotional reactivity, emotional eating, and obesity: A naturalistic study. *Journal of Behavioral Medicine*, *6*, 135-149.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, Brenda W J H., & Zitman, F. G. (2010). Overweight, obesity, and depression: A systematic review and meta-analysis of longitudinal studies. *Archives of General Psychiatry, 67*, 220-229.

Mark, A. L. (2008). Dietary therapy for obesity: an emperor with no clothes. *Hypertension*, *51*, 1426-1434.

Martin, L. E., Holsen, L. M., Chambers, R. J., Bruce, A. S., Brooks, W. M., Zarcone, J. R., & Savage, C. R. (2010). Neural mechanisms associated with food motivation in obese and healthy weight adults. *Obesity*, *18*, 254-260.

Maunder, R. G., & Hunter, J. J. (2001). Attachment and psychosomatic medicine: developmental contributions to stress and disease. *Psychosomatic Medicine*, *63*, 556-567.

Mazzeschi, C., Pazzagli, C., Laghezza, L., Radi, G., Battistini, D., & De Feo, P. (2014). The role of both parents' attachment pattern in understanding childhood obesity. *Frontiers in Psychology*, *5*, 791.

McGee, R. K. (1962). The relationship between response style and personality variables: The measurements of response acquiescence. *The Journal of Abnormal and Social Psychology*, *64*, 229-233.

McKenna, R. J. (1972). Some effects of anxiety level and food cues on the eating behavior of obese and normal subjects: A comparison of the Schachterian and psychosomatic conceptions. *Journal of Personality and Social Psychology*, *22*, 311-319.

Mikulincer, M., Shaver, P. R., & Pereg, D. (2003). Attachment theory and affect regulation: The dynamics, development, and cognitive consequences of attachment-related strategies. *Motivation and Emotion*, *27*, 77-102.

Morosin, A., & Riva, G. (1997). Alexithymia in a clinical sample of obese women. *Psychological Reports*, *80*, 387-394.

Nijs, I. M., Franken, I. H., & Muris, P. (2010). Food-related Stroop interference in obese and normal-weight individuals: Behavioral and electrophysiological indices. *Eating Behaviors*, *11*, 258-265.

Nisbett, R. E. (1968). Taste, deprivation, and weight determinants of eating behavior. *Journal of Personality and Social Psychology*, *10*, 107-116.

Noli, G., Cornicelli, M., Marinari, G. M., Carlini, F., Scopinaro, N., & Adami, G. F. (2010). Alexithymia and eating behaviour in severely obese patients. *Journal of Human Nutrition and Dietetics*, *23*, 616-619.

Osbourne, G. (2016). *Budget 2016.* HM Treasury. Retrieved from https://www.gov.uk/government/speeches/budget-2016-george-osbornes-speech.

Pannacciulli, N., Del Parigi, A., Chen, K., Le, D. S. N., Reiman, E. M., & Tataranni, P. A. (2006). Brain abnormalities in human obesity: a voxel-based morphometric study. *Neuroimage*, *31*, 1419-1425.

Parker, J. D., Taylor, G. J., & Bagby, R. M. (1998). Alexithymia: relationship with ego defense and coping styles. *Comprehensive Psychiatry*, *39*, 91-98.

Pinna, F., Lai, L., Pirarba, S., Orru, W., Velluzzi, F., Loviselli, A., & Carpiniello, B. (2011). Obesity, alexithymia and psychopathology: A case-control study. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *16*, 164-170.

Pothos, E. M., Tapper, K., & Calitri, R. (2009). Cognitive and behavioral correlates of BMI among male and female undergraduate students. *Appetite*, *52*, 797-800.

Rodin, J. (1981). Current status of the internal-external hypothesis for obesity. *American Psychologist*, 36, 361-372.

Rommel, D., Nandrino, J. L., Ducro, C., Andrieux, S., Delecourt, F., & Antoine, P. (2012). Impact of emotional awareness and parental bonding on emotional eating in obese women. *Appetite*, *59*, 21-26.

Ross, L. (1974). Effects of manipulating salience of food upon consumption by obese and normal eaters. In S. Schachter., & J. Rodin (Eds.), *Obese humans and rats* (pp. 43-51). Oxford, England: Lawrence Erlaubm.

Schachter, S. (1971). Some extraordinary facts about obese humans and rats. *American Psychologist, 26,* 129-144.

Schachter, S., Goldman, R., & Gordon, A. (1968). Effects of fear, food deprivation, and obesity on eating. *Journal of Personality and Social Psychology*, *10*, 91-97.

Scharmüller, W., Übel, S., Ebner, F., & Schienle, A. (2012). Appetite regulation during food cue exposure: a comparison of normal-weight and obese women. *Neuroscience Letters*, *518*, 106-110.

Schore, A, N. (2005). Back to basics: attachment, affect regulation and the developing right brain: linking developmental neuroscience to pediatrics. *Pediatric Review, 26,* 204-217.

Schultes, B., Ernst, B., Wilms, B., Thurnheer, M., & Hallschmid, M. (2010). Hedonic hunger is increased in severely obese patients and is reduced after gastric bypass surgery. *The American Journal of Clinical Nutrition*, *92*, 277-283.

Shaver, P. R., & Mikulincer, M. (2007). Adult attachment strategies and the regulation of emotion. In Gross (Ed). *Handbook of Emotion Regulation*. New York; London: Guilford Press.

Sifneos, P. E. (1996). Alexithymia: past and present. *The American Journal of Psychiatry*, *153*, 137-142.

Slochower, J., & Kaplan, S. P. (1980). Anxiety, perceived control, and eating in obese and normal weight persons. *Appetite*, *1*, 75-83.

Slochower, J., Kaplan, S. P., & Mann, L. (1981). The effects of life stress and weight on mood and eating. *Appetite*, *2*, 115-125.

Solomon, D. H., Dillard, J. P., & Anderson, J. W. (2002). Episode type, attachment orientation, and frame salience: Evidence for a theory of relational framing. *Human Communication Research*, *28*, 136-152.

Solomon, J., & George, C. (1999). *The measurement of attachment security in infancy and childhood*. Handbook of attachment: Theory, research, and clinical applications. New York: Guilford Press.

Stenhammar, C., Olsson, G. M., Bahmanyar, S., Hulting, A. L., Wettergren, B., Edlund, B., & Montgomery, S. M. (2010). Family stress and BMI in young children. *Acta Paediatrica*, *99*, 1205-1212.

Stoeckel, L. E., Kim, J., Weller, R. E., Cox, J. E., Cook, E. W., & Horwitz, B. (2009). Effective connectivity of a reward network in obese women. *Brain Research Bulletin*, *79*, 388-395.

Stoeckel, L. E., Weller, R. E., Cook, E. W., Twieg, D. B., Knowlton, R. C., & Cox, J. E. (2008). Widespread reward-system activation in obese women in response to pictures of high-calorie foods. *Neuroimage*, *41*, 636-647.

Stunkard, A. (1959). Obesity and the denial of hunger. *Psychosomatic Medicine*, *21*, 281-289.

Stunkard, A., & Koch, C. (1964). The interpretation of gastric motility: Apparent bias in the reports of hunger by obese persons. *Archives of General Psychiatry*, *11*, 74-82.

Sung, J., Lee, K., & Song, Y. M. (2009). Relationship of eating behavior to long-term weight change and body mass index: the Healthy Twin study. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *14*, 98-105.

Taube-Schiff, M., Van Exan, J., Tanaka, R., Wnuk, S., Hawa, R., & Sockalingam, S. (2015). Attachment style and emotional eating in bariatric surgery candidates: The mediating role of difficulties in emotion regulation. *Eating Behaviors*, *18*, 36-40.

Trombini, E., Baldaro, B., Bertaccini, R., Mattei, C., Montebarocci, O., & Rossi, N. (2003). Maternal attitudes and attachment styles in mothers of obese children. *Perceptual and Motor Skills*, *97*, 613-620.

Tuomisto, T., Tuomisto, M. T., Hetherington, M., & Lappalainen, R. (1998). Reasons for initiation and cessation of eating in obese men and women and the affective consequences of eating in everyday situations. *Appetite*, *30*, 211-222.

Van Strien, T., Frijters, J. E., Bergers, G., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and

external eating behavior. *International Journal of Eating Disorders*, *5*, 295-315.

Van Strien, T., Herman, C. P., & Verheijden, M. W. (2009). Eating style, overeating, and overweight in a representative Dutch sample. Does external eating play a role? *Appetite*, *52*, 380-387.

Van Strien, T., & Ouwens, M. A. (2003). Counterregulation in female obese emotional eaters: Schachter, Goldman, and Gordon's (1968) test of psychosomatic theory revisited. *Eating Behaviors*, *3*, 329-340.

Webb, T. L., Totterdell, P., & Ibar, D. N. H. (2015). Foundations and Extensions for the Extended Model: More on Implicit and Explicit Forms of Emotion Regulation. *Psychological Inquiry*, *26*, 123-129.

White, C. A. (1973). *The effects of viewing films of different arousal content on the eating behavior of obese and normal weight subjects.* Unpublished doctoral dissertation, University of Miami Coral Gables.

Wilkinson, L. L., Rowe, A. C., Bishop, R. J., & Brunstrom, J. M. (2010). Attachment anxiety, disinhibited eating, and body mass index in adulthood. *International Journal of Obesity*, *34*, 1442-1445.

Wiser, S., & Telch, C. F. (1999). Dialectical behavior therapy for binge eating disorder. *Journal of Clinical Psychology*, *55*, 755−768.

Wooley, O. W., Wooley, S. C., & Woods, W. A. (1975). Effect of calories on appetite for palatable food in obese and nonobese humans. *Journal of Comparative and Physiological Psychology*, *89*, 619-625.

World Health Organisation. (2008). *Healthy weight, healthy lives: a cross-government strategy for England.* World Health Organisation. Retrieved from http://www.fph.org.uk/uploads/full_obesity_toolkit-1.pdf.

World Health Organisation. (2016). *Obesity and overweight.* World Health Organisation. Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/.

Yu, Y. H., Vasselli, J. R., Zhang, Y., Mechanick, J. I., Korner, J., & Peterli, R. (2015). Metabolic vs. hedonic obesity: a conceptual distinction and its clinical implications. *Obesity Reviews*, *16*, 234-247.

Źak-Gołąb, A., Tomalski, R., Bąk-Sosnowska, M., Holecki, M., Kocełak, P., Olszanecka-Glinianowicz, M., & Zahorska-Markiewicz, B. (2013). Alexithymia, depression, anxiety and binge eating in obese women. *The European Journal of Psychiatry*, *27*, 149-159.

Zijlstra, H., van Middendorp, H., Devaere, L., Larsen, J. K., van Ramshorst, B., & Geenen, R. (2012). Emotion processing and regulation in women with morbid obesity who apply for bariatric surgery. *Psychology & Health*, *27*, 1375-1387.

PAPER B

An investigation of cognitive factors and early attachment experiences in an overweight and obese population

Word Count: 8,680

Abstract

Objective: Psychological factors associated with overweight and obesity remain poorly understood. This study aimed to investigate whether an established cognitive model of Bulimia Nervosa (BN) and binge eating was applicable to an overweight and obese sample.

Method: A total of 164 participants who met the criteria for overweight/obesity (BMI >25) provided demographic details, information about their height and weight, and completed a series of seven self-report questionnaires assessing eating disorder thoughts, core beliefs, early attachment experiences, mood and eating disorder symptoms.

Results: Significant differences were found between employed and unemployed participants in this study. In employed participants, positive correlations were found between BMI, eating disorder thoughts, underlying assumptions and negative self-beliefs, when considered in combination with mood and eating disorder variables. Lower levels of paternal care were also positively correlated with BMI, when considered in combination with mood and eating disorder variables. No significant correlations were found in unemployed participants.

Discussion: The findings support the applicability of a cognitive model of BN and binge eating in an overweight and obese sample. They also draw attention to the role of early attachment experience as a possible developmental pathway for overweight and obesity. Implications for the development of a cognitive model of overweight and obesity are discussed. Clinical interventions based on existing evidence-based

therapies for eating disorders are suggested, and opportunities for prevention efforts informed by attachment theory are highlighted. Limitations include reliance upon self-report and the correlational nature of the analyses used. Recommendations for future research with larger, more representative samples to address these limitations are made.

Keywords*: Obesity, Bulimia Nervosa (BN), binge eating, cognitive, attachment, BMI (Body Mass Index).*

Proposed Journal: Journal of Eating Behaviour (see Appendix A for submission guidelines)

An investigation of cognitive factors and early attachment experiences in an overweight and obese population

Introduction

The increasing prevalence of overweight and obesity is a major public health concern. Defined as abnormal or excessive fat accumulation that may impair health (World Health Organisation (WHO), 2016), obesity is most commonly defined as a body mass index (BMI) over 30. Overweight and obesity are associated with adverse health conditions including type II diabetes, heart disease, musculoskeletal disorders and some cancers (WHO, 2016), and with mental health problems including depression and anxiety (Luppino et al., 2010; Gariepy, Nitka, & Schmitz, 2010).

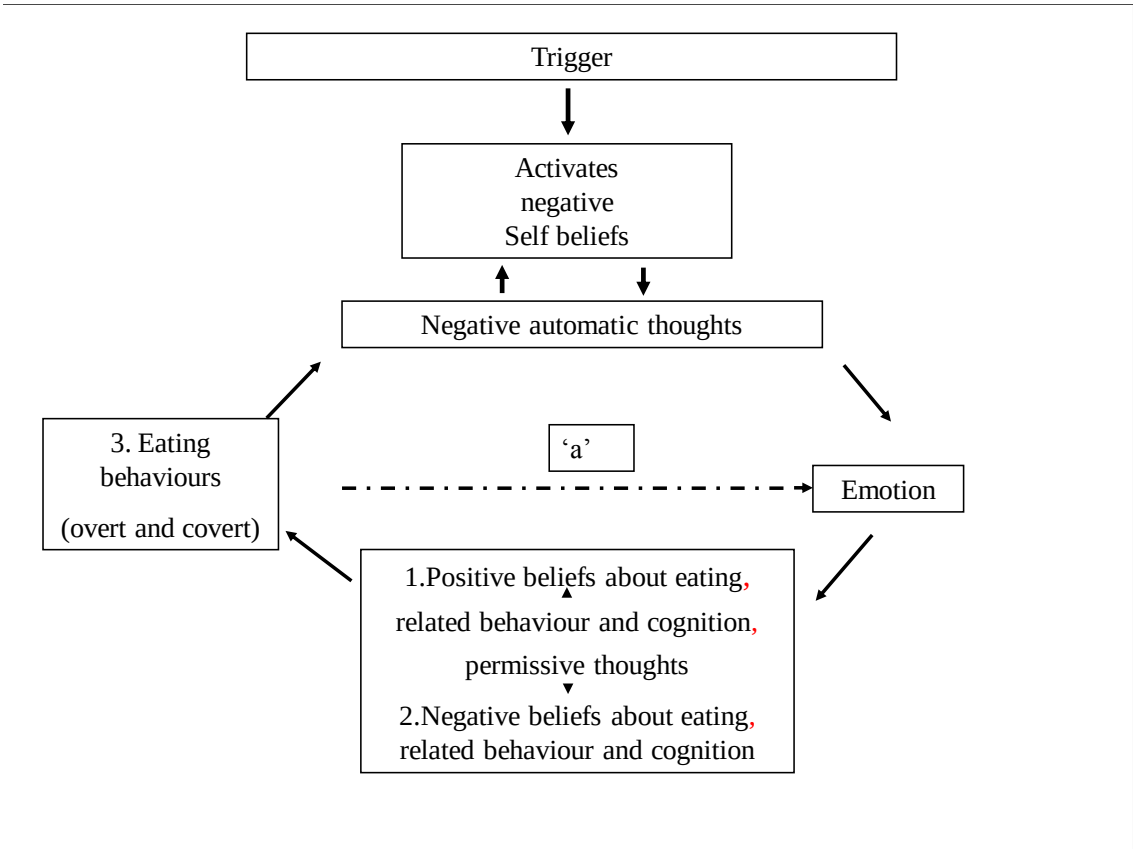
In 2014, more than 1.9 billion adults worldwide were overweight, with over 600 million of these being classified as obese (WHO, 2016). As the prevalence of obesity continues to increase, so do the associated costs. By 2050 the cost of obesity to the UK resulting from reduced productivity and increased demands on health and social care services is predicted to reach just under £50billion (Department of Health, 2011) (see Appendix C for more detailed information about the prevalence, physical, psychological and societal costs associated with obesity).

Several theories have attempted to explain the psychological factors involved in the development and maintenance of obesity. Behavioural theories have largely predominated, explaining excessive eating as an overlearned habit, strongly conditioned to numerous internal and external cues (Leon & Roth, 1977). Psychodynamic (Bruch, 1961), psychosomatic (Kaplan & Kaplan, 1957), socio-cultural

(Stice, 1994) and restraint theories (Rodin, 1981) have also sought to explain experiences and behaviours that lead to overweight and obesity (see Appendix D for a summary of these theories). However, evidence in support of these theories is mixed, and importantly, none have led to the development of effective interventions for individuals who are negatively affected. Additionally, none of the theories consider more recent theoretical developments or research evidence highlighting the important role of cognitions in influencing behaviour (Cooper et al., 1997), or explain how specific cognitions or behaviours arise and lead to the development and maintenance of obesity over time. It is possible that a focus on identifying specific cognitions and behaviours that contribute to overweight and obesity may be more productive.

One existing cognitive model of Bulimia Nervosa (BN) and binge eating (Cooper, Todd, & Wells, 2004; 2009) may be particularly useful, as it is designed to explain 'eating', whether under- or over-eating, with or without compensatory behaviour. A diagrammatic representation of this model is presented in Figure 1.

Figure 1: A cognitive model of Bulimia Nervosa and binge eating (Cooper, Todd, & Wells, 2009)



According to the model, overeating is preceded by the activation of negative self-beliefs and associated emotions. As eating leads to a decrease in intensity of emotional states (Kaye et al., 1986), this behaviour comes to represent positive beliefs such as 'eating will take away my painful feelings'. However, eating is also closely followed by negative beliefs about its potential consequences e.g. 'if I eat I will become fat'. The state of conflict which consequently arises is resolved by a third class of beliefs termed 'permissive beliefs', which relinquish the individual of personal responsibility e.g. 'this will be the last time I eat/binge'. Once permissive thoughts are activated, positive

beliefs about eating predominate and overeating takes place. In the model 'a' refers to the effects of eating as a distraction from the experience of emotional distress.

This model, which explains patterns of eating to manage negative thoughts and their emotions, offers a developmental understanding of maladaptive eating patterns and has received considerable empirical support (see Appendix E for a summary of this research). Furthermore, it has led to the development of evidence-based interventions that are effective in modifying maladaptive eating behaviours (Cooper, 2005; Shapiro et al., 2007). This has generated interest in exploring whether cognitions similar to those identified in BN and binge eating may also contribute to obesity, and whether interventions based on these eating disorder models might therefore inform an effective approach for the treatment of overweight and obese individuals.

There is some evidence that obese individuals hold more negative self-beliefs and dysfunctional cognitions regarding eating, shape and weight than healthy-weight individuals (Adami et al., 1994; O'Connor & Dowrick, 1987; Phelan, 1987; Nauta et al., 2000; Turner, Rose, & Cooper, 2005; Darby et al., 2007; Whittaker, 2011). Furthermore, research has shown that positive and negative beliefs about eating, as well as negative self-beliefs predicted BMI in a community sample of women, a proportion of whom were overweight and obese (Young & Cooper, 2013). However, there is a lack of research exploring these cognitions specifically in overweight and obese samples, and the mechanisms by which these cognitions may influence eating behaviours and contribute to overweight and obesity remains poorly understood.

According to the cognitive model, early negative experiences such as those which may occur within the context of an insecure attachment relationship, give rise to the negative self-beliefs that make an individual vulnerable to developing an eating disorder. There is evidence that attachment disruption and eating disorders are linked (Atlanta, 2008; Ward, Ramsey, & Treasure, 2000), and some authors have suggested that maladaptive eating behaviours (i.e. under or overeating) occur as a means of managing the emotional symptoms associated with an insecure attachment style (Maunder, Hunter, & Lancee, 2011).

Research on attachment in obesity is lacking, and little is currently known about the link between attachment, negative self-beliefs, eating disorder cognitions and overweight and obesity. Preliminary research suggesting a link between disrupted attachment history and the development of obesity comes from a study by Cooper and Young (2015), which found that lower levels of parental emotional warmth and care, and higher levels of parental overprotection and intrusion were associated with higher BMI. Furthermore, this relationship appeared to be mediated by a range of eating disorder thoughts and negative self-beliefs. However, this study investigated a female only sample characterised by the presence of binge eating, and it is therefore unclear whether similar associations would be found in a sample defined by higher BMI rather than eating disorder symptoms.

It is evident that there are gaps in the research in this area. This study will seek to make a unique contribution to the literature, by investigating whether specific aspects of the cognitive model of BN and binge eating (core beliefs and eating disorder thoughts) are associated with BMI in an overweight and obese sample. It will also seek

to explore whether there is an association between attachment history and BMI in this sample, and whether, as in the preliminary research in a community sample (Cooper & Young, 2015), this relationship is mediated by core beliefs and specific eating disorder thoughts. Finally, as previous research has predominantly studied female populations, this study will seek to explore whether there are any gender differences when men and women are considered separately.

The major research questions of the study are:

Does a novel cognitive model of Bulimia Nervosa and binge eating explain overweight and obesity?

What is the role of early attachment experience in explaining overweight and obesity?

Are there gender differences when men and women who are overweight and obese are considered separately?

Hypotheses

1. Core beliefs and specific eating disorder thoughts (as outlined in the cognitive model of BN and binge eating) will explain a significant amount of variance in BMI in a sample of overweight and obese individuals, including when demographics, mood and eating disorder symptoms are taken into account.

2a. On the Parental Bonding Instrument (PBI), maternal and paternal overprotection scores will be positively correlated and maternal and paternal care scores will be negatively correlated with BMI.

2b. The relationship between BMI and attachment will be mediated by core beliefs and eating disorder thoughts.

3. The relationships between BMI, core beliefs, eating disorder thoughts and PBI scores will not differ according to gender.

Method

Participants

Participants were a sample of 164 individuals who met the criteria for overweight or obesity (BMI > 25). Participants were recruited from weight management services in the UK (see Appendix F for list of services involved in recruitment) and by advertising the study online. Participants were excluded from the study if they were under 18 years old, were not fluent in English or were currently pregnant or breastfeeding.

Power

Power can usefully be based on the established power of existing studies. A study by Young and Cooper (2013) conducted a similar hierarchical regression analysis to test the predictive power of eating disorder thoughts, negative self-beliefs and underlying assumptions on BMI and binge eating. This study found several significant predictors of BMI based on an actual sample of 166 participants. G* Power (Faul,

Erdfelder, Buchner, & Lang, 2009), a power analysis programme, similarly calculated that a sample size of 170 was necessary to detect a medium effect size (Cohen, 1992) using the planned regression analyses. The study therefore aimed to recruit a total of 170 participants, 85 men and 85 women.

Design

The study was a cross-sectional survey study design. All participants completed all measures.

Procedure

Study Invitation and Participant Information Sheets (PIS) were given by NHS Weight Management Services to all patients on their waiting list who met eligibility criteria for the study. The PIS contained a link from which participants could access the study online. A copy of the Study Invitation and PIS can be found in Appendix G. Participants were also recruited online using a snowball sampling method (Thompson & Collins, 2002). The study was advertised on social media websites including Facebook, Twitter, Instagram, Gumtree and other websites relevant to overweight and obesity (see Appendix H for study advert). Before providing consent, participants were asked to read information about the study detailing what would be involved, potential risks, and their rights to withdraw their participation (see Appendix I for ethical considerations). The author's contact details were provided in case of further questions. Informed consent to participate in the study was obtained and recorded online. Participants were then asked to provide demographic details and details about their

height and weight, before completing a series of seven questionnaires (see print out of study in Appendix J). The study took on average 20 minutes. Participants' responses were saved online and stored on a secure database.

The first 20 participants were asked, in addition, to give feedback about their experience of completing the questionnaire. Participants who could not access the study online were sent a paper version of the consent form and questionnaires, with a stamped addressed return envelope. On completion of the study participants were presented with a 'useful resources sheet' signposting them to relevant local and national sources of support, including information on how to contact their GP for a referral to an appropriate service or whom to contact in a crisis (see Appendix K). Participants were offered the opportunity to be entered into a prize draw to win Amazon vouchers worth £10, £15 or £20.

Measures

Demographics

Information was collected on participants age, gender, ethnicity, employment status, years in education, physical and mental health history and any medication currently prescribed.

BMI

Participants were asked to disclose their current height and weight. This information was used to determine their BMI using the following formula:

- BMI = weight (kg) / height^2 (m)

Eating Disorder Cognitions

Eating Disorder Thoughts Questionnaire (EDTQ) (Cooper et al., 2006)

This measure of eating disorder related metacognitions is derived from the cognitive model of BN and binge eating (Cooper, Wells, & Todd, 2004). It consists of 26 items, with three subscales measuring positive beliefs about eating, negative beliefs about eating and permissive thoughts. Belief in each item is rated on a scale from 0-100 where 0 means 'I do not usually believe this at all' and 100 means' I am usually completely convinced this is true'.

The measure has good construct and criterion-rated validity and has successfully discriminated eating disorder patients from dieting and non-dieting groups (Cooper et al., 2006). It was used with a community sample that included overweight and obese individuals (Young and Cooper, 2013) which found that negative thoughts about eating explained a significant amount of variance in BMI in women, whilst positive thoughts about eating explained a significant amount of variance in BMI in men.

Eating Disorder Beliefs Questionnaire (EDBQ) (Cooper et al., 1997)

This measure is also derived from the cognitive model of BN. It is a 33-item self-report questionnaire assessing negative self-beliefs and underlying assumptions associated with eating disorders. The measure is composed of four subscales including negative self-beliefs, weight and shape as a means to self-acceptance, weight and shape as a means to acceptance by others and control over eating. Belief in each item is rated

on a scale from 0-100 with end points anchored at 'I do not usually believe this at all' and 'I am usually completely convinced this is true'.

The subscales have good psychometric properties and significant correlations were found between the subscales and other measures of the specific and general psychopathology of eating disorders (Cooper et al., 1997). This measure was also used in the study by Young and Cooper (2013).

Eating Disorder Core Belief Questionnaire (EDCBQ) (Fairchild & Cooper, 2010)

This measure consists of 40 statements representing negative beliefs about the self. The measure has five subscales including self-loathing, unassertive/inhibited, demanding/needing help and support, abandoned/isolated and high standards for self. Participants rate each statement according to the extent the thought describes how they feel about themselves. Responses are given on a Likert scale from 'feels very much untrue' to 'feels very much true'.

Subscales show adequate internal consistency and construct (convergent and discriminant) validity. This questionnaire was used in the study by Young and Cooper (2013), which showed that the subscale high standards for self explained a significant amount of variance in BMI.

Attachment

Parental Bonding Instrument (PBI) (Parker, Tulping, & Brown, 1979)

The PBI is a 25-item self-report retrospective questionnaire measuring the perception of parental bonding during the first 16 years of life. The measure consists of two subscales: care and overprotection, which measure fundamental parental styles as perceived by the individual. Participants are asked to rate each item on a four-point Likert scale from 'very like my parent' to 'very unlike my parent' and each item is scored twice, once considering the mother and once considering the father. Low scores on the care dimension and high scores on the overprotection dimension indicate unhealthy child parent bonding (and thus likely an insecure attachment) and are thought to be risk factors for development of psychopathology.

The PBI has good internal consistency and test re-test reliability. It is widely used in eating disorder research and its subscales have been shown to be highly stable over time (Cohen, 1992). It has satisfactory construct and convergent validity and is independent of mood effects. It was used in a study which found that maternal and paternal overprotection was positively correlated with BMI, whilst maternal and paternal care was negatively correlated with BMI in a community sample including overweight and obese participants (Young & Cooper, 2013).

Eating Disorder Symptoms

Eating Attitudes Test (EAT-26) (Garner & Garfinkel, 1979; Garner, Olmsted, Bohr, & Garfinkel, 1982)

This measure of eating disturbance consists of 26 items and is an abbreviated version of the original scale (EAT-40). The EAT-26 is highly correlated with the EAT-40 and has been shown to have good reliability, validity and internal consistency. Participants are asked to indicate how much they feel each item applies to themselves on a Likert scale, with responses that range from 'always' to 'never'. This measure was included so that eating disorder symptoms could be controlled for in the regression analyses.

Eating disorder behaviours

Dutch Eating Behaviour Questionnaire (DEBQ) (Van Strien, Frijters, Bergers, & Defares, 1986)

This measure consists of 33 items and has three subscales measuring restrained eating, emotional eating and external eating. Participants are asked to score each item according to how true they feel it is about themselves on a Likert scale ranging from 'never' to 'very often'. The questionnaire has high internal consistency and factorial validity for all sub-scales. It was included to measure dietary restraint which is commonly but not always associated with overweight/obesity (Lluch et al., 2000).

Mood

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)

The HADS is a 14-item self-report questionnaire measuring symptoms of anxiety and depression over the past seven days. Participants are asked to rate how much each item relates to themselves on a four point Likert scale, with higher scores being indicative of greater symptom severity. The measure has good homogeneity and reliability (Spinhoven et al., 1997), excellent internal consistency (Savard, Laberge, & Gauthier, 1998), and has been widely used in clinical and non-clinical populations (Mykletun, Stordal, & Dahl, 2001). The HADS was included because individuals with a high BMI often report symptoms of depression and anxiety (Goldney & Wittert, 2009) and it was therefore considered important to control for these in the regression analyses.

Ethical approval

The study received sponsorship approval from the University of Oxford and received full ethical approval from the NHS West of Scotland Research Ethics Committee. See Appendix L for sponsorship, ethical and course approval letters.

Data Analysis

Data were analysed using the Statistical Package for Social Sciences (SPSS, version 24). Descriptive statistics were performed on the data. A one-sample Kolmogorov-Smirnov test was used to determine whether the dependent variable was normally distributed. Results indicated that the distribution of BMI was negatively

skewed (see Appendix M). This was not corrected for by transformations of the data, and non-parametric analyses were therefore used when available. The data was trimmed and two cases with extreme BMI values were removed for the purposes of data analysis.

Initial explorations of the data also revealed high levels of collinearity between the independent variables. This, in addition to the fact that the dependent variable (BMI) was not normally distributed, meant the assumptions of the planned regression analysis were violated and could not be completed by the researcher as originally planned. An alternative method of analysis was therefore chosen, that would enable the researcher to at least partially answer the research questions. The study hypotheses were adapted accordingly (see below).

To account for the expected effects of mood and eating disorder symptoms on BMI (see Appendix N for theoretical rationale) a combination variable was created using the following formula:

[HADS depression + HADS anxiety]

X

[EAT-26 + DEBQ restrained]

This combination variable was, in turn, multiplied by the variables of interest in the study hypotheses (core beliefs, eating disorder thoughts and scores on the PBI), and Spearman's correlations were used to determine the relationship of these factors to BMI. Using this method, the following hypotheses were investigated:

1. The combined effect of mood and eating disorder symptoms, together with core beliefs and eating disorder thoughts will be positively correlated with BMI in an overweight and obese sample.

2. The combined effect of mood and eating disorder symptoms, together with scores on the Parental Bonding Instrument will be positively correlated with BMI in an overweight and obese sample

3. The relationships between BMI and the combined effect of mood and eating disorder symptoms, together with core beliefs, eating disorder thoughts and scores on the Parental Bonding Instrument will not differ according to gender.

The original study hypothesis 2b, that the relationship between BMI and attachment will be mediated by core beliefs and specific eating disorder thoughts, required regression analyses to be determined. It was not therefore possible to investigate this hypothesis using the data collected from this sample.

Results

Sample characteristics

In total, 164 participants, 139 women (mean age = 38.4, SD = 10.5, range 18 to 71) and 25 men (mean age = 41.9, SD = 13.3, range 22 to 71) completed the study. Thirty participants started the measures but did not complete them. These participants were not included in the analysis as people were advised they could withdraw participation from the study by exiting the survey before completion. Four participants completed the measures but had a BMI under 25 and were therefore also excluded from the analysis. A total of 29 participants indicated that they were receiving support from a weight management service, 121 participants indicated that they were not receiving any support and 12 participants did not disclose this information (see Appendix O for comparison between these groups).

The mean age of the sample was 38.97 (SD = 11.0, range 18-71). For the purpose of statistical analysis, the demographic variables ethnicity, years in education, employment status and marital status were simplified into two categories, due to the small number of participants in some categories. The demographic characteristics of the sample are displayed in table 1.

Table 1: Demographic characteristics of the sample (N = 164)

Characteristic	N	Percentage (%)
Gender		
Women	139	85
Men	25	15
Ethnicity		
White	153	93.3
Other ethnic background	11	6.6
Years in Education*		
0-12	36	22
>12	125	76
Employment status**		
Employed	127	77
Unemployed	36	22
Marital status		
Married	61	37
Not married	103	63

*missing data = 3 (n = 161)

**missing data = 1 (n = 163)

The sample was predominantly from a white ethnic background (93.3%, n = 153). Seventy-six percent (n = 125) of the sample had spent over 12 years in education and 77% (n = 127) were currently employed (full time or part time). Thirty-seven percent (n = 61) of the sample were married.

The mean BMI of the sample was 36.1 (SD = 7.99, range 25.2 – 64.5). The sample distribution of BMI categories, according to WHO definitions (WHO, 2016) is displayed in table 2.

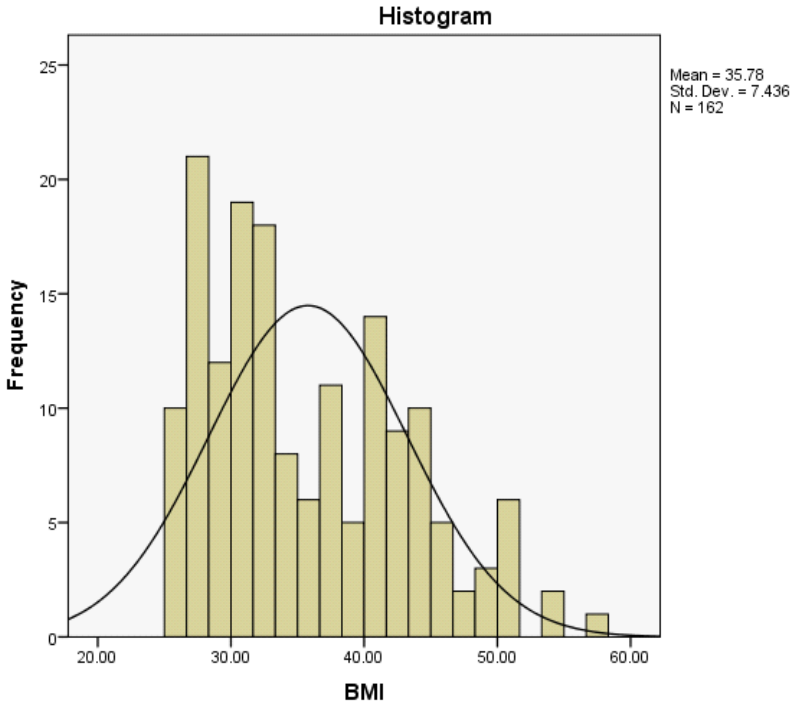
Table 2: Sample distribution of BMI categories

BMI category	Percentage (n)
Overweight (BMI 25-29.9)	25.6% (n = 42)
Obese (BMI 30-39.9)	41.4% (n = 68)
Morbidly obese (BMI >40)	33% (n = 54)

BMI = Body Mass Index

The mean BMI for women was 36.5 (SD = 8.06, range 25.2 to 64.5) and for men was 33.99 (SD = 7.4 , range 26 to 56.7). The distribution of BMI for the sample is shown in figure 2.

Figure 2: Sample distribution of BMI

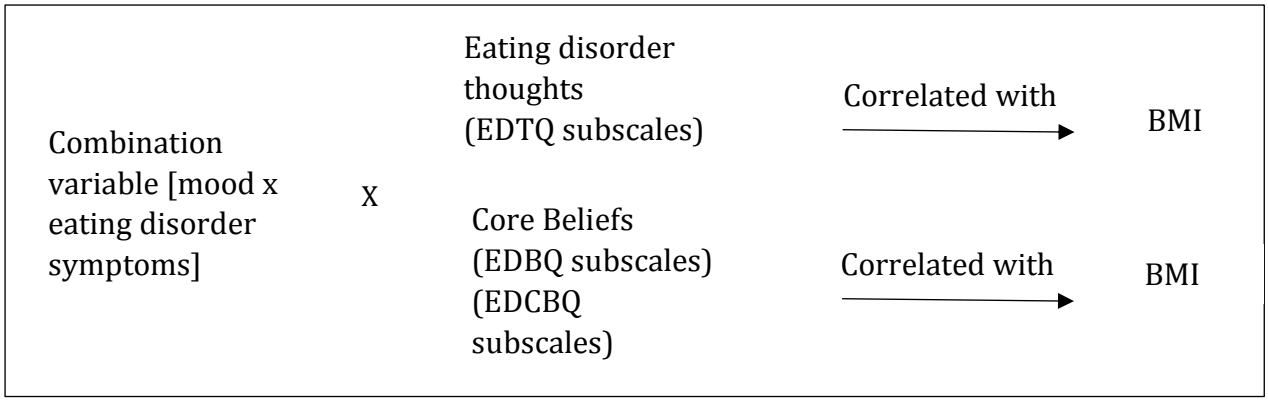


Preliminary analyses were conducted to investigate the possible demographic cause of what appeared to be a bimodal distribution in BMI, using data collected from the relevant variables (see appendix P). Mann Whitney U tests showed there was no significant difference in BMI between males and females (however, there were far fewer male participants than female, and the same result may not have been found with equivalent sample sizes). No significant differences in BMI related to age, ethnicity, marital status or years in education were found. There was, however, a strong effect of employment status on BMI in this sample. Box plots and Mann Whitney U tests revealed that participants who were unemployed had a significantly higher BMI (*Mdn* = 41.3) than participants who were employed (*Mdn* = 32.96), $U = 1337$, $z = -3.56$, $p < .001$. As this effect was so large, it may have masked any further effects of the substantive hypotheses and it was therefore decided to divide the sample by employment status and examine each hypothesis for each group independently. These findings will now be presented.

1. The combined effect of mood and eating disorder symptoms, together with core beliefs and eating disorder thoughts will be positively correlated with BMI in an overweight and obese sample.

The mood and eating disorder combination variable was multiplied by each subscale of the core belief and eating disorder measures, and one-tailed Spearman's correlations were used to examine the relationship between this factor and BMI (see figure 3 for description of analysis).

Figure 3: Description of analysis



EDTQ = Eating Disorder Thoughts Questionnaire
EDBQ = Eating Disorder Belief Questionnaire
EDCBQ = Eating Disorder Core Belief Questionnaire

Findings

Employed sample

Eating Disorder Thoughts

Positive correlations were found between BMI and the combined effect of mood and eating disorder symptoms with all three EDTQ subscales: negative thoughts, r_s = .193, n = 162, p = .015; positive thoughts, r_s = .162, n = 162, p = .035; and permissive thoughts, r_s = .193, n = 162, p = .015.

Core Beliefs

Positive correlations were also found between BMI and the combined effect of mood and eating disorder symptoms with the EDBQ subscales negative self-beliefs, r_s = .151, n = 162, p = .046 and acceptance by others, r_s = .217, n = 162, p = 0.07.

No significant correlations were found between BMI and the combined effect of mood and eating disorder symptoms with the EDCBQ subscales. However, there was a positive correlation between BMI and the combined effect of mood and eating disorder

symptoms with the EDCBQ subscale self-loathing which approached significance, r_s = .151, n = 162, p = .054. It may be that with a larger sample this would have reached significance.

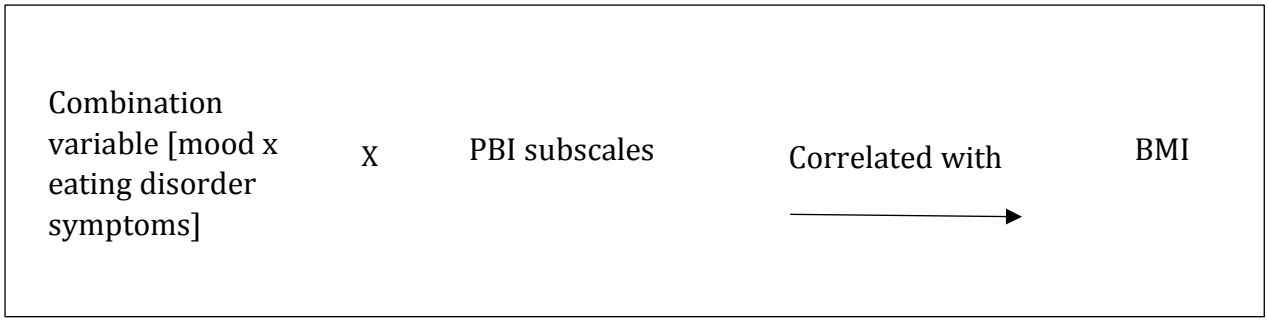
Unemployed sample

No significant correlations between BMI and the combined effects of mood and eating disorder symptoms, together with eating disorder thoughts or core beliefs were found.

2. The combined effect of mood and eating disorder symptoms, together with scores on the Parental Bonding Instrument will be positively correlated with BMI in an overweight and obese sample.

This hypothesis was addressed by repeating the above analysis, with the subscales of the PBI replacing the subscales of the eating disorder thoughts and core belief measures. For this analysis, the PBI maternal and paternal care subscales were reverse-scored (such that an increased score reflected lower levels of perceived care) and so these scores were in the same direction as the mood and eating disorder symptom variables. One-tailed Spearman's correlations were used to examine the relationship between these factors with BMI (see figure 4).

Figure 4: Description of analysis



PBI = Parental Bonding Instrument

Findings

Employed sample

A positive correlation was found between BMI and the combined effect of mood and eating disorder symptoms with the PBI subscale paternal care, $r_s = .151$, $n = 162$, $p = .045$. No significant correlations between BMI and the combined effect of mood and eating disorder symptoms with the other PBI subscales were found.

Unemployed sample

No significant correlations between BMI and the combined effects of mood and eating disorder symptoms, together with the PBI subscales were observed in the unemployed sample.

3. The relationship between BMI, core beliefs, eating disorder thoughts and PBI scores will not differ according to gender.

Kolmogorov-Smirnov tests were used to determine whether core belief, eating disorder thought and PBI subscales were normally distributed (Appendix M). Results indicated that the subscales were not normally distributed and Mann Whitney U tests were therefore used to investigate whether there were significant differences between males and females in their scores on these variables. Spearman's correlations were then used to explore any further gender differences in the relationship between these variables with BMI. Due to the significant interaction of employment status with BMI, and the small number of men in the unemployed category, this hypothesis was only investigated for the employed participants.

Findings

Females had significantly higher scores on the EDTQ subscale negative thoughts (*Mdn* = 54.0) than males (*Mdn* = 34.5), *U* = 704.5, *z* = -2.37, *p* = .018. Females also had higher scores on the EDCBQ subscale abandoned/isolated (*Mdn* = 2) than males (*Mdn* = 0.75), *U* = 659.0, *z* = -2.688, *p* = .007. Analysis of EDBQ subscales showed that females scored significantly higher on the negative self-belief subscale (*Mdn* = 30.0) than males (*Mdn* = 10.5), *U* = 757.5, *z* = -2.02, *p* = .004, as well as on the subscale acceptance by others (*Mdn* = 32) than males (*Mds* =17.05), *U* = 707, *z* = -2.365, *p* = .002. No significant differences were observed between males and females with regard to their scores on the PBI subscales.

Spearman's one-tailed correlations revealed that in females, there was a positive correlation between BMI and the EDTQ negative thoughts subscale ($r_s = .219$, $n = 106$, $p = .012$), the EDCBQ abandoned/isolated subscale ($r_s = .199$, $n = 137$, $p = .010$) and the EDBQ acceptance by others subscale ($r_s = .233$, $n = 106$, $p = .008$). However, there were no significant correlations between any of these variables and BMI in males. These findings need to be interpreted with caution due to the small number of males recruited in this study. It may be that with a larger sample of men, more significant correlations may have emerged in this group.

Discussion

The aim of this study was to investigate whether an established cognitive model of BN and binge eating (Cooper, Todd, & Wells, 2004; 2009) was applicable to an overweight and obese population. The main findings are discussed below, alongside their theoretical and clinical implications. The limitations of the study are considered, and directions for future research are highlighted.

Employment status

An interesting, yet unexpected finding, was the strong association between employment status and BMI in this sample. Unemployed participants had a significantly higher BMI than participants who were employed (either full-time or part-time). However, this is in line with large scale cross-sectional and longitudinal research which demonstrates that unemployment is positively associated with BMI and obesity (Monsivais et al., 2015). Furthermore, there were significant differences between these

groups on the cognitive and attachment variables measured, and in the relationships between these variables and BMI (see Appendix Q).

Whilst these differences may, in part, be attributable to the smaller number of unemployed participants in the study (and the smaller range in BMI within this sub-sample), it may also suggest that different underlying cognitions and experiences explain BMI in these groups. For example, in unemployed individuals, obesity may be related to underlying physical or mental health conditions which also affect ability to work, or to socio-economic factors, such as the cost of buying healthier foods and having less opportunity to engage in physical activity. Future research might usefully explore whether the differences observed are unique to this sample, or whether they represent two distinct sub-groups, with implications for the development of more individualised interventions.

Due to the lack of significant findings observed in the unemployed participants (see Appendix Q for further discussion about possible reasons for this), only findings relevant to employed participants are discussed below. In considering these findings it is important to note that the correlational nature of the analyses does not allow for conclusions to be drawn regarding causation. Future research might usefully seek to address this.

Cognitions

Positive beliefs about eating, negative beliefs about eating and permissive thoughts, together with mood and eating disorder symptoms, were positively correlated with BMI. Significant correlations were also observed between BMI, negative

self-beliefs, and beliefs that body weight and shape are a means to achieving acceptance by others, together with mood and eating disorder symptoms. This suggests that eating disorder thoughts, underlying assumptions and core beliefs outlined in the cognitive model of BN and binge eating, may also be present in some individuals who are overweight and obese. Furthermore, level of these cognitions appears to be associated with level of overweight and obesity.

These findings are in line with previous research which found higher levels of eating disorder thoughts and negative self-beliefs in overweight compared to healthy-weight individuals (Whittaker, 2011), and with findings that eating disorder thoughts and negative self-beliefs explained a significant amount of variance in BMI in a sample that included obese participants (Young & Cooper, 2013). However, it is important to note that the strength of the correlations observed in this study were relatively weak. Whilst this may be due to recruiting a non-clinical sample that included participants on the cusp of being overweight and who might not therefore see their weight as a problem or something to be changed, the weak correlations observed may also reflect the important role of possible confounds (including biological, socio-economic, lifestyle and educational factors) in explaining the development of overweight and obesity. Further research is therefore necessary to determine to what extent cognitive factors can explain overweight and obesity, and to what extent therefore recommendations for interventions based on these factors can be made.

Attachment

Lower perceived levels of paternal care, together with mood and eating disorder variables, were positively correlated with BMI. However, no other significant correlations with the PBI subscales were found. This is different to the findings of Young & Cooper (2013), who found reduced maternal and paternal care and increased maternal and paternal overprotection were significantly associated with BMI. However, participants of that study were not exclusively overweight or obese, and were selected based on the presence of eating disorder symptoms. The findings of the current study may suggest that early attachment experiences are less relevant for individuals with overweight and obesity, than for individuals with BN or who binge eat. Another possibility is that the current study was more homogenous in terms of BMI than previous studies, and lack of an association between attachment and BMI is due to restricted variance in BMI in the current sample.

Gender differences

Female participants had higher levels of negative beliefs about eating, negative self-beliefs, beliefs about being abandoned and isolated and underlying assumptions that body weight and shape are a means to achieving acceptance by others. Furthermore, whilst in female participants, positive correlations were found between BMI and these cognitions (together with mood and eating disorder variables), no such correlations were observed in males.

These findings should be interpreted with caution due to the small number of males in this study. The results may also reflect gender differences in willingness to

report particular thoughts and beliefs. However, findings highlight the need to consider differences between men and women with overweight and obesity, and preliminarily suggests that the types of cognitions outlined in the cognitive model of BN and binge eating may be less relevant for males than females.

Implications

Theoretical

The finding that positive, negative and permissive thoughts are relevant in an overweight and obese sample suggests they may be important in explaining how maladaptive eating behaviours are maintained in these conditions. Negative self-beliefs and underlying assumptions were correlated with higher BMI, suggesting that overweight and obese individuals may cope with these cognitions and their associated emotions by eating. The cognitive model suggests that through this mechanism, positive beliefs about eating are maintained. However, the model predicts that eating does not modify underlying assumptions, and may reinforce negative self-beliefs, leaving the individual vulnerable to future episodes of eating, which, over time, may contribute to overweight and obesity.

The finding that low levels of perceived paternal care were positively correlated with higher BMI also lends support to the cognitive model, which suggests that early experiences in which there was a perceived lack of care may be associated with the formation of enduring beliefs and expectations about the self and relationships with others which make an individual vulnerable to experiencing the negative emotions, and maladaptive eating behaviours that contribute to overweight and obesity.

Support for these aspects of the cognitive model suggests they could usefully be incorporated into the development of a cognitive model of overweight and obesity.

Clinical

Clinical interventions designed to reduce overweight and obesity might usefully draw upon existing Cognitive Behavioural Therapy (CBT) techniques for BN and binge eating, which are effective in modifying maladaptive eating behaviours (Cooper, Todd, & Wells, 2009). Techniques such as thought challenging and behavioural experiments could be used to challenge positive, negative and permissive thoughts that maintain episodes of overeating, and build more positive self-beliefs that enhance self-efficacy and motivation to engage with weight management attempts.

Stigmatization and discrimination are issues commonly faced by individuals who are overweight and obese (Puhl & Brownell, 2001; Wang, Brownell, & Wadden, 2004), and weight bias internalization may reinforce negative self-beliefs and feelings of self-loathing (Ratcliffe & Ellison, 2015). Working to reduce stigma by promoting an understanding of the complexity of weight regulation may lead to a reduction in these beliefs, and hence the use of eating to cope with associated negative emotions. Third wave CBT approaches, such as Acceptance and Commitment Therapy might also help individuals develop alternative ways to respond to painful thoughts and feelings, and cultivate an awareness of the body and mind that facilitates more conscious choices around eating behaviour (Ciarrochi, Harris, & Bailey, 2014).

Early intervention and prevention has been identified as key to tackling the obesity epidemic (WHO, 2000). This study preliminarily suggests that prevention

approaches could usefully be informed by attachment theory, for example supporting mothers and fathers in knowing how to provide the warmth, care and affection that may protect against the development of self-beliefs associated with maladaptive eating behaviours. However, further research with larger, more representative samples is needed to confirm the associations found and determine whether this is an appropriate approach to prevention.

The finding that in women, assumptions about body weight and shape being a means to acceptance by others suggests a need for wider, policy level interventions, as these assumptions may be understood as the result of internalized narratives of the thin body image ideal so often reinforced by the media and dieting industry. Such messages may be particularly influential for young teenagers, as this is a critical period for the development of underlying assumptions and self-beliefs (Erikson, 1968). Working alongside policy makers, as well as with educators in schools, to promote messages of healthy body acceptance, may offer an important way to reduce these assumptions that otherwise drive maladaptive eating behaviours.

Limitations and recommendations for future research

This study has a number of limitations. As has already been mentioned, the findings presented are only relevant to overweight and obese individuals who are employed, and cannot therefore be generalised. The sample size of unemployed participants was relatively small. Whilst it was unexpected that the sample would have to be divided by employment status for analysis, future research might use the findings of this study to recruit a larger sample of unemployed participants, as a greater number

of significant relationships between variables may emerge in this sub-group. Furthermore, in this study, the unemployed sample included individuals who were unable to work, who were seeking work, who were homemakers and who were retired. Future research with larger numbers of participants in each of these categories may reveal further differences between these categories in the variables of interest in this study. Additionally, only a small number of men were recruited. This may be due to advertising the study on websites more commonly visited by women. Alternatively, this may reflect gender differences in the perception of overweight and obesity (Muhihi et al., 2012) or willingness to participate in online research (Smith, 2008). The applicability of these findings to men needs to be interpreted with caution.

This study relied solely on the use of self-report measures, including for the reporting of weight, which may be subject to bias in those who are overweight and obese (Cooper & Warren, 2011). Whilst weighing and measuring participants may have been ideal, this would have required individual participant contact and the study would likely have recruited far fewer participants. Self-report measures are also subject to recall and social desirability bias (Herbert et al., 1997), and self-report measures of attachment have been further criticized as they only access an individual's conscious appraisal of themselves within attachment relationships, rather than the influence of their unconscious internal working model (Mazzeschi, 2014). Future studies may consider using a range of more comprehensive measures, such as the adult attachment interview (George, Kaplan, & Main, 1996).

The use of correlational analyses prevents conclusions regarding causation being drawn. Furthermore, as combination variables were used, it is difficult to

determine what proportion of the relationships observed are explained by mood, eating disorder, cognitive and attachment variables respectively. Research with larger, more representative samples, using longitudinal designs and drawing upon models of mediating and moderating influences, could seek to explore this, and establish the causational nature of the relationships observed. This study highlights the need for future research to consider gender differences in the cognitions and experiences that lead to overweight and obesity, as well as the importance of considering attachment relationships to fathers, an area that can sometimes be neglected in attachment research.

Given the relevance of thoughts and beliefs outlined in the cognitive model of BN and binge eating, studies might usefully explore the links between cognitions and behaviours that are proposed, as well as evaluating and exploring outcomes of cognitive therapy with overweight and obese individuals based on this model (Cooper, Todd, & Wells, 2004; 2009). The therapeutic processes may offer further opportunity to identify thoughts and beliefs that are particularly relevant to this group.

Finally, this study was concerned primarily with the role of cognitions in explaining overweight and obesity. As obesity is a multifaceted condition, these findings should be integrated with research from other disciplines, as well as other areas of psychological research, to obtain a comprehensive understanding of the development and maintenance of overweight and obesity.

Conclusion

The findings of this study support the applicability of a cognitive model of BN and binge eating in an overweight and obese sample. In particular, eating disorder thoughts, negative self-beliefs and assumptions about body weight and shape as a means to acceptance by others, together with mood and eating disorder variables, were correlated with higher BMI. The study also draws attention to the role of early attachment experience as a possible developmental pathway for thoughts and negative self-beliefs that may predispose to the development of overweight and obesity. However, the findings of this study are preliminary, and further research with larger more representative samples is needed to determine the causality and directionality of the relationships found. This research enhances our psychological understanding of overweight and obesity, an area which is currently under-researched. The cognitions and attachment experiences highlighted could usefully be incorporated into the development of a cognitive model of overweight and obesity, which has the potential to enhance treatment outcomes through building on existing evidence based interventions. The current findings also indicate useful avenues for further research into overweight and obesity.

See Appendix R for the authors personal reflections on the dissertation.

References

Adami, G. F., Gandolfo, P., Campostano, A., Bauer, B., Cocchi, F., & Scopinaro, N. (1994). Eating disorder inventory in the assessment of psychosocial status in the obese patients prior to and at long term following biliopancreatic diversion for obesity. *International Journal of Eating Disorders*, *15*, 265-274.

Atlanta, G. (2008). Eating disorders in the context of attachment theory. *Anatolian Journal of Psychiatry, 9,* 97-104.

Bruch, H. (1961). Transformation of oral impulses in eating disorders: A conceptual approach. *Psychiatric Quarterly*, *35*, 458-481.

Ciarrochi, J., Harris, R., & Bailey, A. (2014). *The weight escape*. Australia: Penguin Group.

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*, 155-159.

Cooper, M. J. (2005). Cognitive therapy in anorexia nervosa and bulimia nervosa: Progress, development and future directions. *Clinical Psychology Review, 25,* 511-533.

Cooper, M., Cohen-Tovée, E., Todd, G., Wells, A., & Tovée, M. (1997). The eating disorder belief questionnaire: Preliminary development. *Behaviour Research and Therapy*, *35*, 381-388.

Cooper, M. J., Todd, G., and Wells, A. (2009). *Cognitive Therapy for Bulimia Nervosa.* London: Taylor & Francis.

Cooper, M. J., Todd, G., Woolrich, R., Somerville, K., & Wells, A. (2006). Assessing eating disorder thoughts and behaviors: The development and preliminary evaluation of two questionnaires. *Cognitive Therapy and Research*, *30*, 551-570.

Cooper, M. J., & Warren, L. (2011). The relationship between body weight (body mass index) and attachment history in young women. *Eating Behaviors*, *12*, 94-96.

Cooper, M. J., Wells, A., & Todd, G. (2004). A cognitive model of bulimia nervosa. *British Journal of Clinical Psychology*, *43*, 1-16.

Cooper, M. J., & Young, E. (2015). Parental Bonding and Body Mass Index in a Female Community Sample: The Mediating Role of Eating Disorder Thoughts and Core Beliefs. *Behavioural and Cognitive Psychotherapy*, *44*, 123-127.

Darby, A., Hay, P., Mond, J., Rodgers, B., & Owen, C. (2007). Disordered eating behaviours and cognitions in young women with obesity: relationship with psychological status. *International Journal of Obesity*, *31*, 876-882.

Department Of Health. (2011). *Healthy lives, healthy people: a call to action on obesity in England*. Department Of Health: London. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/213720/dh_130487.pdf.

Erikson, E. H. (1968). *Identity: Youth and Crisis.* Norton: New York: Norton.

Fairchild, H., & Cooper, M. (2010). A multidimensional measure of core beliefs relevant to eating disorders: Preliminary development and validation. *Eating Behaviors*, *11*, 239-246.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*, 1149-1160.

Gariepy, G., Nitka, D., & Schmitz, N. (2010). The association between obesity and anxiety disorders in the population: a systematic review and meta-analysis.

International Journal of Obesity, *34*, 407-419.

Garner, D. M., & Garfinkel, P. E. (1979). The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, *9*, 273-279.

Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: psychometric features and clinical correlates. *Psychological Medicine*, *12*, 871-878.

George, C., Kaplan, N., & Main, M. (1996). *Adult attachment interview*. (Unpublished manuscript). University of California, Berkeley.

Goldney, R. D., & Wittert, G. (2009). Obesity and depression or anxiety. *British Medical Journal*, *339*, 871-876.

Hebert, J. R., Ma, Y., Clemow, L., Ockene, I. S., Saperia, G., Stanek, E. J., & Ockene, J. K. (1997). Gender differences in social desirability and social approval bias in dietary self-report. *American Journal of Epidemiology*, *146*, 1046-1055.

Kaplan, H. I., & Kaplan, H. S. (1957). The psychosomatic concept of obesity. *Journal of Nervous and Mental Disease, 125,* 181-201.

Kaye, W. H., Gwirtsman, H. E., George, D. T., Weiss, S. R., & Jimerson, D. C. (1986). Relationship of mood alterations to bingeing behaviour in bulimia. *The British Journal of Psychiatry*, *149*, 479-485.

Leon, G. R., & Roth, L. (1977). Obesity: Psychological causes, correlations, and speculations. *Psychological Bulletin*, *84*, 117-139.

Lluch, A., Herbeth, B., Mejean, L., & Siest, G. (2000). Dietary intakes, eating style and overweight in the Stanislas Family Study. *International Journal of Obesity*, *24*, 1493-1499.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of General Psychiatry, 67*, 220-229.

Maunder, R. G., Hunter, J. J., & Lancee, W. J. (2011). The impact of attachment insecurity and sleep disturbance on symptoms and sick days in hospital-based health-care workers. *Journal of Psychosomatic Research*, *70*, 11-17.

Mazzeschi, C., Pazzagli, C., Laghezza, L., Radi, G., Battistini, D., & De Feo, P. (2014). The role of both parents' attachment pattern in understanding childhood obesity. *Frontiers in Psychology*, *5*, 791.

Monsivais, P., Martin, A., Suhrcke, M., Forouhi, N. G., & Wareham, N. J. (2015). Job-loss and weight gain in British adults: evidence from two longitudinal studies. *Social Science & Medicine*, *143*, 223-231.

Muhihi, A. J., Njelekela, M. A., Mpembeni, R., Mwiru, R. S., Mligiliche, N., & Mtabaji, J. (2012). Obesity, overweight, and perceptions about body weight among middle-aged adults in Dar es Salaam, Tanzania. *ISRN obesity*.

Mykletun, A., Stordal, E., & Dahl, A. A. (2001). Hospital Anxiety and Depression (HAD) scale: factor structure, item analyses and internal consistency in a large population. *The British Journal of Psychiatry*, *179*, 540-544.

Nauta, H., Hospers, H. J., Jansen, A., & Kok, G. (2000). Cognitions in obese binge eaters and obese non-binge eaters. *Cognitive Therapy and Research*, *24*, 521-531.

O'Connor, J., & Dowrick, P. W. (1987). Cognitions in normal weight, overweight, and previously overweight adults. *Cognitive Therapy and Research*, *11*, 315-326.

Parker, G., Tupling, H., & Brown, L. B. (1979). A parental bonding instrument. *British Journal of Medical Psychology*, *52*, 1-10.

Phelan, P. W. (1987). Cognitive correlates of bulimia: The bulimic thoughts questionnaire. *International Journal of Eating Disorders*, *6*, 593-607.

Puhl, R. M., & Brownell, K. D. (2001). Bias, discrimination and obesity. *Obesity Research, 9*, 788-805.

Ratcliffe, D., & Ellison, N. (2015). Obesity and internalized weight stigma: A formulation model for an emerging psychological problem. *Behavioural and Cognitive Psychotherapy*, *43*, 239-252.

Rodin, J. (1981). Current status of the internal-external hypothesis for obesity. *American Psychologist*, *36,* 361-372.

Savard, J., Laberge, B., & Gauthier, J. G. (1998) Evaluating anxiety and depression in HIV-infected patients. *Journal of Personality Assessment*, *73*, 336-349.

Shapiro, J. R., Berkman, N. D., Brownley, K. A., Sedway, J. A., Lohr, K. N., & Bulik, C. M. (2007). Bulimia nervosa treatment: a systematic review of randomized controlled trials. *International Journal of Eating Disorders*, *40*, 321-336.

Smith, W. G. (2008). Does gender influence online survey participation? A record-linkage analysis of university faculty online survey response behavior. *Online Submission*. Retrieved from https://eric.ed.gov/?id=ED501717.

Spinhoven, P. H., Ormel, J., Sloekers, P. P. A., Kempen, G. I. J. M., Speckens, A. E. M., & Van Hemert, A. M. (1997). A validation study of the Hospital Anxiety and Depression

Scale (HADS) in different groups of Dutch subjects. *Psychological Medicine*, *27*, 363-370.

Stice, E. (1994). Review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review*, *14*, 633-661.

Thompson, S. K., & Collins, L. M. (2002). Adaptive sampling in research on risk-related behaviors. *Drug and Alcohol Dependence, 68*, 57-67.

Turner, H. M., Rose, K. S., & Cooper, M. J. (2005). Schema and parental bonding in overweight and non-overweight female adolescents. *International Journal of Obesity*, *29*, 381-387.

Van Strien, T., Frijters, J. E., Bergers, G., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, *5*, 295-315.

Wang, S. S., Brownell, K. D., & Wadden, T. A. (2004). The influence of the stigmas of obesity on overweight individuals. *International Journal of Obesity, 28*, 1333-1337.

Ward, A., Ramsay, R., & Treasure, J. (2000). Attachment research in eating disorders. *British Journal of Medical Psychology*, *73*, 35-51.

Whitaker, S. (2011). *Developing a cognitive formulation and applying a cognitive model of bulimia nervosa and binging to adult obesity*. (Unpublished Doctoral Dissertation). University of Oxford, Oxford.

World Health Organisation. (2000). *Obesity: preventing and managing the global epidemic*. World Health Organisation. Retrieved from http://www.who.int/nutrition/publications/obesity/WHO_TRS_894/en/.

World Health Organisation. (2016). *Obesity and overweight, Factsheet no. 311*. World Health Organisation. Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/.

Young, E., & Cooper, M. (2013). Applying a cognitive model to binge eating in a female community sample. *Eating Behaviors*, *14*, 295-298.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*, 361-370.

Appendices

Appendix A

Submission guidelines for the Journal of Eating Behaviour

PREPARATION

References

There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct.

Formatting requirements

There are no strict formatting requirements but all manuscripts must contain the essential elements needed to convey your manuscript, for example Abstract, Keywords, Introduction, Materials and Methods, Results, Conclusions, Artwork and Tables with Captions.
If your article includes any Videos and/or other Supplementary material, this should be included in your initial submission for peer review purposes.
Divide the article into clearly defined sections.
Figures and tables embedded in text
Please ensure the figures and the tables included in the single file are placed next to the relevant text in the manuscript, rather than at the bottom or the top of the file.

REVISED SUBMISSIONS

Use of word processing software
Regardless of the file format of the original submission, at revision you must provide us with an editable file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be removed and replaced on processing the article. The electronic text should be prepared in a way very similar to that of conventional manuscripts (see also the Guide to Publishing with Elsevier: http://www.elsevier.com/guidepublication). See also the section on Electronic artwork. To avoid unnecessary errors you are strongly advised to use the 'spell-check' and 'grammar-check' functions of your word processor.

Article structure

Subdivision - numbered sections

Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods
Provide sufficient detail to allow the work to be reproduced. Methods already published should be indicated by a reference: only relevant modifications should be described.

Theory/calculation
A Theory section should extend, not repeat, the background to the article already dealt with in the Introduction and lay the foundation for further work. In contrast, a Calculation section represents a practical development from a theoretical basis.

Results
Results should be clear and concise.

Discussion
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices
If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: Eq. (A.1), Eq. (A.2), etc.; in a subsequent appendix, Eq. (B.1) and so on. Similarly for tables and figures: Table A.1; Fig. A.1, etc.

Essential title page information

• ***Title.*** Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• ***Author names and affiliations.*** Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower- case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• ***Corresponding author.*** Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**
• ***Present/permanent address.*** If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Abstract
A concise and factual abstract is required. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Graphical abstract
Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. See http://www.elsevier.com/graphicalabstracts for examples.
Authors can make use of Elsevier's Illustration and Enhancement service to ensure the best presentation of their images and in accordance with all technical requirements: Illustration Service.

Highlights
Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). See http://www.elsevier.com/highlights for examples.

Keywords
Immediately after the abstract, provide a maximum of 6 keywords, using American spelling and avoiding general and plural terms and multiple concepts (avoid, for example, 'and', 'of'). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations
Define abbreviations that are not standard in this field in a footnote to be placed on the first page of the article. Such abbreviations that are unavoidable in the abstract must be defined at their first mention there, as well as in the footnote. Ensure consistency of abbreviations throughout the article.

Acknowledgements
Collate acknowledgements in a separate section at the end of the article before the references and do not, therefore, include them on the title page, as a footnote to the title or otherwise. List here those individuals who provided help during the research (e.g., providing language help, writing assistance or proof reading the article, etc.).

Math formulae
Please submit math equations as editable text and not as images. Present simple formulae in line with normal text where possible and use the solidus (/) instead of a horizontal line for small fractional terms, e.g., X/Y. In principle, variables are to be presented in italics. Powers of e are often more conveniently denoted by exp. Number

consecutively any equations that have to be displayed separately from the text (if referred to explicitly in the text).

Footnotes

Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Artwork

Electronic artwork
General points
• Make sure you use uniform lettering and sizing of your original artwork.
• Preferred fonts: Arial (or Helvetica), Times New Roman (or Times), Symbol, Courier.
• Number the illustrations according to their sequence in the text.
• Use a logical naming convention for your artwork files.
• Indicate per figure if it is a single, 1.5 or 2-column fitting image.
• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.
• Please note that individual figure files larger than 10 MB must be provided in separate source files. A detailed guide on electronic artwork is available on our website: http://www.elsevier.com/artworkinstructions.
You are urged to visit this site; some excerpts from the detailed information are given here.

Formats
Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below):
EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'.
TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi.
TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi.
TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

Please do not:
• Supply files that are optimized for screen use (e.g., GIF, BMP, PICT, WPG); the resolution is too low. • Supply files that are too low in resolution.
• Submit graphics that are disproportionately large for the content.
Color artwork
Please make sure that artwork files are in an acceptable format (TIFF (or JPEG), EPS (or PDF), or MS Office files) and with the correct resolution. If, together with your accepted article, you submit usable color figures then Elsevier will ensure, at no additional charge, that these figures will appear in color online (e.g., ScienceDirect and other sites) regardless of whether or not these illustrations are reproduced in color in the printed version. **For color reproduction in print, you will receive information regarding the costs from Elsevier after receipt of your accepted article**. Please indicate your preference for color: in print or online only. For further information on the preparation of electronic artwork, please see http://www.elsevier.com/artworkinstructions.
Please note: Because of technical complications that can arise by converting color figures to 'gray scale' (for the printed version should you not opt for color in print) please submit in addition usable black and white versions of all the color illustrations.

Figure captions
Ensure that each illustration has a caption. A caption should comprise a brief title (**not** on the figure itself) and a description of the illustration. Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Please submit tables as editable text and not as images. Tables can be placed either next to the relevant text in the article, or on separate page(s) at the end. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules.

References

Citation in text
Please ensure that every reference cited in the text is also present in the reference list (and vice versa). Any references cited in the abstract must be given in full. Unpublished results and personal communications are not recommended in the reference list, but may be mentioned in the text. If these references are included in the reference list they should follow the standard reference style of the journal and should include a substitution of the publication date with either 'Unpublished results' or 'Personal communication'. Citation of a reference as 'in press' implies that the item has been accepted for publication.

Web references
As a minimum, the full URL should be given and the date when the reference was last accessed. Any further information, if known (DOI, author names, dates, reference to a source publication, etc.), should also be given. Web references can be listed separately (e.g., after the reference list) under a different heading if desired, or can be included in the reference list.

References in a special issue
Please ensure that the words 'this issue' are added to any references in the list (and any citations in the text) to other articles in the same Special Issue.

Reference management software
Most Elsevier journals have a standard template available in key reference management packages. This covers packages using the Citation Style Language, such as Mendeley (http://www.mendeley.com/features/reference-manager) and also others like EndNote (http://www.endnote.com/support/enstyles.asp) and Reference Manager (http://refman.com/support/rmstyles.asp). Using plug-ins to word processing packages which are available from the above sites, authors only need to select the appropriate journal template when preparing their article and the list of references and citations to these will be formatted according to the journal style as described in this Guide. The process of including templates in these packages is constantly ongoing. If the journal you are looking for does not have a template available yet, please see the list of sample references and citations provided in this Guide to help you format these according to the journal style.
If you manage your research with Mendeley Desktop, you can easily install the reference style for this journal by clicking the link below: http://open.mendeley.com/use-citation-style/eating-behaviors

When preparing your manuscript, you will then be able to select this style using the Mendeley plug- ins for Microsoft Word or LibreOffice. For more information about the Citation Style Language, visit http://citationstyles.org.

Reference formatting
There are no strict requirements on reference formatting at submission. References can be in any style or format as long as the style is consistent. Where applicable, author(s) name(s), journal title/book title, chapter title/article title, year of publication, volume number/book chapter and the pagination must be present. Use of DOI is highly encouraged. The reference style used by the journal will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be highlighted at proof stage for the author to correct. If you do wish to format the references yourself they should be arranged according to the following examples:

Reference style
Text: Citations in the text should follow the referencing style used by the American Psychological Association. You are referred to the Publication Manual of the American Psychological Association, Sixth Edition, ISBN 978-1-4338-0561-5, copies of which may be ordered from http://books.apa.org/books.cfm?id=4200067 or APA Order Dept., P.O.B. 2710, Hyattsville, MD 20784, USA or APA, 3 Henrietta Street, London, WC3E 8LU, UK.

List: references should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters 'a', 'b', 'c', etc., placed after the year of publication.

Examples:
Reference to a journal publication:
Van der Geer, J., Hanraads, J. A. J., & Lupton, R. A. (2010). The art of writing a scientific article. *Journal of Scientific Communications, 163*, 51–59.
Reference to a book:
Strunk, W., Jr., & White, E. B. (2000). *The elements of style.* (4th ed.). New York: Longman, (Chapter 4).
Reference to a chapter in an edited book:
Mettam, G. R., & Adams, L. B. (2009). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), *Introduction to the electronic age* (pp. 281–304). New York: E-Publishing Inc.

Video data
Elsevier accepts video material and animation sequences to support and enhance your scientific research. Authors who have video or animation files that they wish to submit with their article are strongly encouraged to include links to these within the body of the article. This can be done in the same way as a figure or table by referring to the video or animation content and noting in the body text where it should be placed. All submitted files should be properly labeled so that they directly relate to the video file's content. In order to ensure that your video or animation material is directly usable, please provide the files in one of our recommended file formats with a preferred maximum size of 150 MB. Video and animation files supplied will be published online in the electronic version of your article in Elsevier Web products, including ScienceDirect: http://www.sciencedirect.com. Please supply 'stills' with your files: you can choose any frame from the video or animation or make a separate image. These will be used instead of standard icons and will personalize the link to your video data. For more detailed

instructions please visit our video instruction pages at http://www.elsevier.com/artworkinstructions. Note: since video and animation cannot be embedded in the print version of the journal, please provide text for both the electronic and the print version for the portions of the article that refer to this content.

AudioSlides

The journal encourages authors to create an AudioSlides presentation with their published article. AudioSlides are brief, webinar-style presentations that are shown next to the online article on ScienceDirect. This gives authors the opportunity to summarize their research in their own words and to help readers understand what the paper is about. More information and examples are available at http://www.elsevier.com/audioslides. Authors of this journal will automatically receive an invitation e-mail to create an AudioSlides presentation after acceptance of their paper.

Supplementary material

Elsevier accepts electronic supplementary material to support and enhance your scientific research. Supplementary files offer the author additional possibilities to publish supporting applications, high- resolution images, background datasets, sound clips and more. Supplementary files supplied will be published online alongside the electronic version of your article in Elsevier Web products, including ScienceDirect: http://www.sciencedirect.com. In order to ensure that your submitted material is directly usable, please provide the data in one of our recommended file formats. Authors should submit the material in electronic format together with the article and supply a concise and descriptive caption for each file. For more detailed instructions please visit our artwork instruction pages at http://www.elsevier.com/artworkinstructions.

Submission checklist

The following list will be useful during the final checking of an article prior to sending it to the journal for review. Please consult this Guide for Authors for further details of any item.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:
• E-mail address
• Full postal address
All necessary files have been uploaded, and contain: • Keywords
• All figure captions
• All tables (including title, description, footnotes)

Further considerations
• Manuscript has been 'spell-checked' and 'grammar-checked'
• All references mentioned in the Reference list are cited in the text, and vice versa
• Permission has been obtained for use of copyrighted material from other sources (including the Internet)
Printed version of figures (if applicable) in color or black-and-white
• Indicate clearly whether or not color or black-and-white in print is required.
• For reproduction in black-and-white, please supply black-and-white versions of the figures for printing purposes.
For any further information please visit our customer support site at http://support.elsevier.com.

Appendix B

Search Strategy for Paper A

Relevant literature was obtained from searches using online databases including PsychINFO, NHS Evidence, Google Scholar and SCOPUS. The reference lists of included papers were also hand searched for relevant papers.

The following search terms were applied for each prediction respectively:

- Hunger, satiety, appetite, regulation, disturbance, sensitivity AND obesity, overweight
- External, eating, cue AND obesity, overweight
- Emotion*, eating AND obesity, overweight
- Interoceptive, sensitivity, emotion* awareness, alexithymia AND obesity, overweight
- Emotion, regulation, dysregulation, cognitive reappraisal, suppression, AND obesity, overweight
- Attachment AND obesity, overweight
- Feeding AND obesity, overweight

Papers were included if they examined constructs relevant to psychological theories of obesity. No publication date restrictions were imposed.

Papers were excluded if they were not written in English. Qualitative studies and non-published dissertations were also excluded.

Appendix C

The prevalence, physical, psychological and societal costs associated with obesity

Prevalence

The rapid increase in the number of overweight and obese people in the UK is a major concern (Butland et al., 2007). Rates of obesity have more than doubled in the last 25 years (Department of Health (DH), 2008). In England, two thirds of adults and a third of children are currently overweight or obese (Craig & Shelton, 2007). Based on current trends, 60% of the UK population are predicted to be obese by the year 2050 (Butland et al., 2007).

Overweight and obesity are present across all ages, genders, ethnicities and socio-economic groups. Prevalence rates of obesity are similar for men and women, with around a quarter of each gender being affected (Craig & Shelton, 2007). However, women are more likely to be morbidly obese than men (Barker, 2017). There has been an upward shift in level of overweight and obesity across all age groups in the last decade, and data shows that the age group most likely to be overweight or obese is the 55-64 age bracket (Craig & Shelton, 2007). The prevalence of obesity in the UK is currently greatest in Caucasian and Bangladeshi populations (Butland et al., 2007). The prevalence of obesity has also been positively associated with lower socio-economic status (Craig & Shelton, 2007).

Health Implications

Being overweight or obese is associated with increased risk of developing the health conditions diabetes, cancer, heart and liver disease, stroke, metabolic syndrome, sleep apnoea and osteoarthritis, among others (DH, 2008). Furthermore, the risks associated with these conditions increase the more overweight people become (DH, 2008). Ten percent of all cancer deaths among non-smokers are related to obesity (Kopelman, 2007). The risk of developing Coronary Artery Disease is known to increase 3.6 times for each unit increase in BMI, and eighty-five percent of hypertension has been associated with having a BMI over 25 (Kopelman, 2007). Additionally, the risk of developing type II diabetes is 20 times greater for people who have a BMI over 35, compared to individuals with a BMI between 18 and 25 (Field et al., 2001). These diseases reduce life expectancy and quality of life. Data shows that severely obese individuals are likely to die on average 11 years earlier (13 years earlier for those with severe obesity) than individuals with a healthy body weight (Fontaine et al., 2003). In contrast, marked benefits to an individual's health can be achieved with a relatively modest body weight reduction of 10% (National Institute of Health and Care Excellence (NICE), 2006).

Research has reported significant associations between obesity and mental health problems including depression and anxiety (Luppino et al., 2010; Gariepy et al., 2010). Weight stigma, an issue commonly faced by individuals who are overweight and obese, has also been shown to increase vulnerability to depression, low self-esteem, poor body image, maladaptive eating behaviours and exercise avoidance (Phul & Heuer, 2009). Whilst the relationship between obesity and mental health is complex, it is likely

that a bi-directional relationship between these variables exists, with multiple mediating and moderating factors.

Economic and societal costs

A greater awareness of the disease burden associated with overweight and obesity has led to concern about the economic implications of the obesity epidemic (Butland et al., 2007). Personal and social costs (such as morbidity, mortality, discrimination and social exclusion) exist alongside significant health and social care costs, for example, associated with the treatment of obesity and its consequences. It has been estimated that by 2050, the cost of overweight and obesity to the NHS could reach £9.7billion (Butland et al., 2007). Costs to the wider economy resulting from increased sickness and disability absence from work, reduced productivity, and greater reliance upon state benefit and social care services are also rising. It has been estimated that by 2050, the wider cost to society could reach £9.6 billion (Butland et al., 2007).

Appendix D

Psychological theories of obesity

Behavioural theories explain excessive eating as an overlearned habit, strongly conditioned to numerous internal and external cues (Leon & Roth, 1977). Behavioural approaches to the treatment of obesity, typically involving behaviour change strategies designed to increase physical exercise and reduce energy intake have, however, shown disappointing results. Although some individuals lose weight in the short term, long term outcomes are poor (Garner & Wooley, 1991; Wilson, 1994).

Psychodynamic theory (Bruch, 1961; 1973) attributes obesity to negative experiences in the early child-caregiver relationship, which interfere with an individual's ability to differentiate the urge to eat from other signals of emotional discomfort. As a result, individuals overeat in response to both sets of sensations, which leads to obesity. Psychosomatic theories (Kaplan & Kaplan 1957; Schachter, Goldman, & Gordon, 1968; Schachter, 1971) also explain obesity as the result of an inability to distinguish feelings of hunger from other emotions. Biological and learning factors are implicated in the development of this inability, with eating subsequently thought to occur to reduce negative affect (Kaplan & Kaplan, 1957) and in response to external cues in the environment (Schachter, Goldman & Gordon, 1968; Schachter, 1971).

Escape from self-awareness theory postulates that obesity is a result of overeating which functions to narrow an individual's focus of attention away from self-critical thoughts and associated negative emotions (Heatherton & Baumeister, 1991). Socio-cultural models (Stice, 1994) link psychosomatic and escape from self-awareness theories via an association with body-dissatisfaction. Body-dissatisfaction, caused by an

internalisation of the societal thin body-image ideal, leads to dietary restraint and negative emotions which the individual is motivated to avoid by eating.

Restraint theory (Rodin, 1981) explains overeating as an inevitable result of the cognitive effort commonly experienced by obese individuals to balance the restriction of food intake with their desire to eat. Internal (e.g. strong emotional states) and external factors (e.g. alcohol consumption) have both been shown to temporarily decrease the motivation to diet and enable overeating to take place.

There has been a concerted effort to develop a cognitive behavioural model of obesity. However, this model focusses primarily on explaining the maintenance of weight loss (Cooper, Fairburn, & Hawker, 2003). It outlines the way in which individuals who have lost some weight no longer believe they can control their weight due to two processes: the slowing down in weight loss that occurs after 4-6 months, and the realisation that weight loss will not necessarily lead to the achievement of either their weight loss goals or their primary goals. As a result, they abandon their attempts to lose weight. The treatment includes weight loss strategies and body image work, and uses both cognitive and behavioural interventions. However, the specific cognitions and behaviours are not specified and little is said about the development or maintenance of obesity. Moreover, a large randomised controlled trial found the outcomes of this treatment to be disappointing, as although the majority of patients lost weight initially, nearly all were found to have regained this weight at long-term follow-up (Cooper et al., 2010).

Appendix E

Evidence for the cognitive model of Bulimia Nervosa and binge eating (Cooper, Todd, & Wells, 2004; 2009)

A brief summary of evidence for the cognitive model of BN and binge eating is given below (for a more detailed summary see Cooper, 2005).

The presence of automatic thoughts related to food, eating, weight and shape in individuals with BN and binge eating is well established (Cooper, 1997; 2005) and has been confirmed using a variety of measures and methodologies including clinical interviews, self-report questionnaires and experimental research designs. Positive and negative beliefs about eating have also been found at higher levels in patients with BN than healthy weight controls (Cooper et al., 1997; Cooper & Hunt, 1998; Leung, Waller, & Thomas, 1999; Waller, Meyer, & Ohanian, 2001). Furthermore, these thoughts have been shown to predict increased severity of eating disorder symptoms (Cooper et al., 2006). Negative beliefs about eating have been confirmed to operate at two levels, firstly linking eating behaviour with weight gain (e.g. if I eat then I will become fat), and secondly linking eating behaviour with negative self-beliefs (e.g. if I eat then I have failed) (Cooper, Wells, & Todd, 2004).

Studies have shown that individuals with BN have more negative core beliefs and underlying assumptions about eating weight and shape than do healthy controls (Leung, Waller, & Thomas, 1999; Waller, Ohanian, Meyer, & Osman, 2000; Cooper et al., 1997; Cooper & Hunt, 1998) which, in turn, are associated with eating disorder symptoms including bingeing and self-induced vomiting (Waller, Meyer, & Ohanian, 2001; Goldfein, Walsh, & Midlarsky, 2000). Furthermore, evidence supports the

prediction that binge eating is preceded by emotional and cognitive distress, the most commonly reported emotion prior to bingeing being depression and anxiety (Elmore & de Castro, 1990). Studies have shown that binge eating is effective in reducing emotional distress, with levels of anxiety and depression both decreasing as an episode of binge eating proceeds (Kaye et al., 1986; Hsu, 1990). The consequences of a binge eating episode have also been studied. Research has found that negative emotions (particularly depression) and cognitions focused on self-loathing, guilt and disgust significantly increase following a binge (Elmore & de Castro, 1990; Hsu, 1990; Cooper et al., 1988).

Appendix F

List of services involved in participant recruitment

The authors of this study would like to thank the staff at the following weight management services for the time and support they dedicated to recruiting participants for this study:

Weigh Forward Bucks, High Wycombe

More Life, Oxfordshire

Luton and Dunstable University Hospital Foundation Trust

Coventry and Warwickshire University Hospital Foundation Trust

Mid Yorkshire Hospitals NHS Foundation Trust

Heart of England NHS Foundation Trust

Derbyshire Community Health Services NHS Foundation Trust

Fakenham Medical Practice, North Norfolk

4 Healthy Weight, Kent

Appendix G

Study Invite Letter and Participant Information Sheet

Study Invite Letter

[Insert relevant service address]

STUDY INVITE LETTER

Investigating the psychological factors associated with being overweight and/or obese

IRAS ID: 198873

You are invited to take part in a research study

We would like to invite you to take part in a research study that will seek to better understand the psychological factors associated with weight gain and which may make it difficult for overweight people to lose weight.

You have been invited to take part as you are currently engaging with a weight loss management programme in the UK, and the researchers would be interested in learning about your experiences.

The study is being undertaken by Trainee Clinical Psychologist Esme Banting and is an educational project that will be completed in part fulfilment of the requirements for a doctoral degree in Clinical Psychology at the University of Oxford.

Participation in the study would involve you completing a series of questionnaires online. These questionnaires will ask about eating related thoughts, beliefs, behaviours and experiences. It is hoped that the research will enhance our understanding of factors that lead to weight gain and may inform the development of new psychological treatments that can support people in losing weight in the future.

If you are interested in taking part please read the accompanying 'Participant Information Sheet' which contains more detailed information about the study and instructions for how you can access the study online.

Alternatively, if you have any questions about the research or your participation, please feel free to contact Esme by email at: esme.banting@hmc.ox.ac.uk. She is also contactable by telephone Monday-Friday during the hours of 9am-5pm for research purposes and you can reach her on the following number: 07751 585 942.

Please note that there is no obligation for you to take part in the study. Please also be assured that any personal data you have provided to the service has not been shared with the researcher or the University.

The service will not be informed about whether or not you respond to the researcher or go on to complete the study and your decision to participate or not participate will in no way affect your treatment with this or any other service, now or in the future.

Yours Sincerely,

[named member of service]

Participant Information Sheet

Esme Banting
Trainee Clinical Psychologist

Oxford Institute of Clinical Psychology Training
Isis Education Centre

Warneford Hospital

Headington

Oxford

OX3 7JX

General Office: 01865 226 431

PARTICIPANT INFORMATION SHEET

Investigating the psychological factors associated with being overweight and/or obese

IRAS ID: 198873

You are invited to take part in a research study

We would like to invite you to take part in a research study. Before you decide whether to take part, it is important that you understand why the research is being done and what it would involve for you. Please take time to read this information and discuss it with others if you wish. If there is anything that is not clear, or if you *would like more information, please ask.*

What is the purpose of the study?

Excess weight is a common but complex and multifaceted problem that is increasing in prevalence worldwide. It is a condition that has proven difficult to treat, perhaps in part because its complexity is not yet fully understood.

It is hoped that achieving a greater understanding of the psychological factors associated with the development and maintenance of weight gain may improve treatment outcomes.

This study will seek to explore the psychological experiences (thoughts, beliefs and early attachment experiences) of a group of overweight and obese individuals. It is hoped that this information will enhance our understanding of these conditions and lead to the development of more effective treatment interventions.

Why have I been invited?

We are aiming to hear from a total of 170 people (85 men and 85 women) over a 12 month period, who have a BMI of over 25. You have been invited to participate because you are either attending an NHS service for weight loss or have identified that you would like to take part in the research through a study advert.

To calculate your BMI and determine whether you are eligible to participate in the study please use the following formula or the NHS BMI calculator at the following website: http://www.nhs.uk/tools/pages/healthyweightcalculator.aspx

$$BMI = \frac{(\text{weight in kilograms})}{\text{height in meters}^2}$$

Please note you will not be eligible to take part in the study if you are currently pregnant or breastfeeding. The study is also only open to people who are currently living within the UK.

Do I have to take part?

No – it is completely up to you whether or not you wish to take part in this study. Your decision not to take part will in no way affect your treatment if you are currently receiving support from a weight loss management service, or with any other services you may have contact with.

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

If you decide to take part then you can access the study online at the following website address: **http://tinyurl.com/j4waeqa**. You will initially be asked to complete a participant consent form and following this to provide your contact details, demographic information, and information about your height and weight.

You will then be asked to complete a series of 7 questionnaires which ask about your experiences of eating, thoughts and beliefs you hold about yourself, your mood and your early attachment experiences.

It is estimated that these questionnaires will take approximately half an hour to complete, but if you are unable to complete all of the questionnaires in one sitting you can return to the study at a later time and pick up from where you last saved your response. Please note that you will need to use the same computer or device to log in each time you do this.

If you are one of the first 10 participants to complete the study, you will be asked to complete an additional questionnaire asking for your feedback about your experience of taking part. This feedback will be used to make amendments to the study and improve the process for future participants.

.Following completion of the consent form you will be provided with a resource list signposting you to useful local and national sources of support. All participants will also have the option to enter a prize draw. Three prizes will be offered: £10, £15 or £20 of amazon vouchers. There will be an additional option for the research team to send you a reminder text or email about completing the questionnaires.
The study is designed to be completed online; however, if you are unable to access this please contact the researcher who will arrange for paper copies of the consent form and questionnaires to be sent to you by post. You will be able to complete these by hand and return the completed study questionnaires in a self-addressed envelope provided by the researcher.

Are there any possible benefits in taking part?

There will not be any direct benefit to you from participating in this study. However, it is hoped that your participation will help us in understanding weight gain and maintenance and improve the psychological treatments available in the future to support people who find it difficult to lose weight.

Are there any possible disadvantages or risks from taking part?

Completing the questionnaires may take some participants a significant amount of time to complete. The system has therefore been designed to allow you to log in and complete the questionnaires at a time that is convenient for you, save your progress, and log back in to complete the questionnaires later on if needed.

Some participants may find the content of the questionnaires emotional or distressing. If you find that this is the case then you do not need to complete them.

In the rare event that the researcher becomes concerned about a participant's wellbeing, and if you have identified that you are currently under the care of a weight management service in the UK, the researcher may break the participant confidentiality agreement in order to share relevant information

with the participant's service and ensure they receive appropriate support (please see the section below for further information).

Will my taking part in the study be kept confidential?

Yes. All information that is collected about you, including all the responses that you give to the questionnaires will be kept completely confidential. Any personal details you provide (i.e. your contact details, demographic details and information about your height and weight) will be stored securely and completely separately from the responses you give to the questionnaires.

Please note that some contact information you provide will be kept by Qualtrics (the online platform used to complete the survey) purely for internal purposes such as technical support and notifying users of changes or enhancements to the service.

All participants will be assigned a unique study ID number, so that their responses to the questionnaires remain anonymous but so their data can be traced if required. If you share information that leads to a concern about you, or those around you, the confidentiality

agreement will be broken and relevant information will be passed onto a member of staff within your service to ensure you receive the appropriate support.
Your data will be stored in accordance with the Data Protection Act, and the University of Oxford's policy of Academic Integrity in Research code of practice and procedure and will only be accessible to the research team.

Any personal contact details will be destroyed by the researcher three months after the end of the study and any study data (i.e. the anonymised responses participants give to the questionnaires) will be destroyed 5 years after the end of the study.

Please note that responsible members of the University of Oxford and the relevant NHS Trust(s) may be given access to data for monitoring and/or audit of the study to ensure that the research is complying with applicable regulations.

Will I be reimbursed for taking part?

As a thank you and recognition for your time you will be entered into a prize draw. There will be three prizes of £10, £15 and £20 of Amazon vouchers.

Should you wish to enter this prize draw, your contact details will be kept separately from your questionnaire information and will be destroyed once the prize draw has taken place.

What happens at the end of the study?

The results of the study will be written up by the researcher Esme Banting in part fulfilment of the requirements for a doctoral degree in Clinical Psychology from the University of Oxford. No personal or identifying information will be included in this write up.
The findings will also be fed back to relevant services and may be published in a peer- reviewed journal.

Although you will not receive any immediate feedback about your individual results, a summary sheet explaining the main findings of the study will be made available to all participants who wish to receive this.

What will happen if I don't want to carry on with the study?

If you do decide to take part, you may also choose to withdraw your participation at any time before the study is completed, without the need to give a reason for your decision to do so. Withdrawing participation will in no way affect your treatment if you are currently receiving support from a weight loss management service. You may withdraw from the study by not completing the online questionnaire, or by contacting the researcher, Esme Banting directly and requesting that the data you have submitted be removed from the study.

What if there is a problem?

The University of Oxford, as Sponsor, has appropriate insurance in place in the unlikely event that you suffer any harm as a direct consequence of your participation in this study.

If you wish to complain about any aspect of the way in which you have been approached or treated during the course of this study, you should contact the researcher's supervisor Myra Cooper (myra.cooper@hmc.ox.ac.uk) or you may contact the University of Oxford Clinical Trials and Research Governance (CTRG) office on 01865 572224, or the head of CTRG, email ctrg@admin.ox.ac.uk.

How have patients and the public been involved in this study?

Service users have helped design and develop this research project and have also been involved in reviewing the Participant Information Sheet. In designing this study we have taken into account service user opinions on the questionnaires that we ask you to complete.

You may find the following links to general information about taking part in research useful: • www.crn.nihr.ac.uk/can-help/patients-carers-public/how-to-take-part-in-a-study/

• www.nhs.uk/Conditions/Clinical-trials/Pages/Introduction.aspx

Who is organising and funding the study?

This study is sponsored by Oxford University and is funded by the Oxford Institute of Clinical Psychology Training. It is an educational project undertaken by Esme Banting in part fulfilment of the requirements for a doctoral degree in Clinical Psychology from the University of Oxford.

Who has reviewed the study?

The study has been reviewed and given favorable opinion by the West of Scotland NHS Research Ethics Committee 5.

Further information and contact details:

Please contact Esme Banting by email at: esme.banting@hmc.ox.ac.uk or by telephone on: 07751 585 942.

Thank you for reading this information.

If you would like to participate in the study you may access this at the following web address:

http://tinyurl.com/j4waeqa.

Appendix H

Study Advert

Are you overweight or obese? Are you over the age of 18 and currently living in the UK?

If so, please take part in an online study to tell us about your psychological experiences! We hope that learning about people's experiences will help us find new ways to support people to manage their weight in the future.

The study involves completing an online questionnaire that takes 20-25 minutes. There is also a chance to win £10, £15 or £20 of Amazon vouchers!

Please visit: http://tinyurl.com/j4waeqa to find out more!

To discuss taking part please contact the researcher Esme Banting (Trainee Clinical Psychologist) directly: esme.banting@hmc.ox.ac.uk Tel: 07751 585 942.

*This study has full approval from NHS West of Scotland REC 5

Appendix I

Ethical Considerations

This research was conducted in accordance with the British Psychological Society's (BPS) Code of Human Research Ethics (BPS, 2014), and guidance for internet mediated research (BPS, 2007). A summary of the ethical issues relevant to this study is provided below.

Informed consent

Prior to participating in the study all participants were required to read a participant information sheet containing information about the purpose of the study and what participation would involve. Participants were not able to complete the study until they had completed the consent form. Consent was assumed if the participant indicated this via the consent form and completed and submitted their answers to the measures.

Participants were made aware that they did not have to participate in the study and that this would in no way affect their treatment with any other service. Participants were advised that they were free to withdraw participation from the study at any time, by contacting the researcher directly or by exiting the study before completion. Participation in the study was limited to individuals aged 18 and over. This age limit was set to ensure that participants had capacity to consent to taking part in the research.

Participant distress

The researcher acknowledged that completing these questionnaires may take some participants a significant amount of time. To reduce the burden on participants, the online study was designed so participants were able to save their progress with completing the questionnaires, and log back into the study as many times as needed to complete these. The researcher considered that some participants may find the content of the questionnaires emotional or distressing. However, it was felt that the content was likely to be familiar to them because of their condition and everyday life experiences, and thus not any more upsetting than in day-to-day life.

All risks associated with taking part in the study were made explicit to participants in the participant information sheet. This information sheet made clear that participants did not have to continue with the study if they experienced any distress. Participants were also provided with a Useful Resource Sheet (see Appendix K), signposting them to relevant local and national sources of support. This sheet also included information on how to contact their GP for a referral to an appropriate service, or whom to contact in a crisis. The email address and telephone number of the researcher were made readily available to participants, to answer any specific questions or concerns regarding the study.

Identification of risk

The following risk protocol was established in case of identification of risk during participant contact. However, it was anticipated that a disclosure of risk would

be rare in this study, as the online questionnaire did not contain any questions that asked directly about this.

It was possible that the researcher may have some contact with participants by phone, and it is possible that in any of these contacts, a significant risk may be disclosed. If this occurs, the researcher would follow the following protocol:

For participants who were recruited via a weight loss management service:

- The participants name and contact details will be traced (these will be stored on a secure, password protected spreadsheet, to which only the researcher will have access). This spreadsheet will include details of which service each participant has been recruited from.
- If a significant risk is identified the researcher will contact a named person (or if a named person is unavailable, a senior clinician) within the participant's service, during working hours (9am-5am Monday-Friday) to share the relevant risk information.
- Any participant who discloses significant risk will be presented with information about whom they should contact in a crisis (their local Accident and Emergency department, or the 24 hour, 7 day a week Samaritans' helpline: 0845 90 90 90). The individual will also be informed about how to contact their GP to seek a referral to an appropriate mental health service.

All potential participants were informed about the limits of confidentiality on the participant information sheet by the following phrase: 'All details that you give about yourself during the research study will be kept anonymous and confidential. However, if you share information that leads to a concern about you, or those around you, relevant information will be passed onto a member of staff within your service, to ensure you receive the appropriate support'. Participants were required to agree to this in the consent form. Participants who were not willing to agree to this were not progressed into the study.

For participants recruited via online advertising:
It was planned that any participant who was recruited via online advertising who disclosed significant risk would be presented with information about whom they should contact in a crisis (their local Accident and Emergency department, or the 24 hour, 7 day a week Samaritans' helpline: 0845 90 90 90). The individual would also be informed about how to contact their GP to seek a referral to an appropriate mental health service.

Anonymity, confidentiality and data storage

This study accessed an adult sample, recruited from weight management services and via online advertising. All participant responses were anonymized and each participant was assigned a unique ID so their data could be traced if required. Participants who wished to take part in the prize draw were required to submit their contact information. This information was stored securely on a password protected

spreadsheet, and kept separate from the responses given to the questionnaires. This information was destroyed once the prize draw had taken place. In accordance with the Data Protection Act (1998), data will be kept for ten years after the completion of this study.

Appendix J

Print out of online study

Investigating the psychological factors associated with obesity
Esme Banting Trainee Clinical Psychologist
Oxford Institute of Clinical Psychology Training Isis Education Centre
Warneford Hospital
Headington
Oxford
OX3 7JX

General Office: 01865 226 431

PARTICIPANT INFORMATION SHEET

Investigating the psychological factors associated with being overweight and obese IRAS ID: 198873

You are invited to take part in a research study

We would like to invite you to take part in a research study. Before you decide whether to take part, it is important that you understand why the research is being done and what it would involve for you. Please take time to read this information and discuss it with others if you wish. If there is anything that is not clear, or if you would like more information, please ask.

What is the purpose of the study?

Excess weight is a complex and multifaceted problem that is increasing in prevalence worldwide. It is a condition that has proven difficult to treat, perhaps in part because its complexity is not yet fully understood. It is hoped that achieving a greater understanding of the psychological factors associated with the development and maintenance of weight gain may improve treatment outcomes. This study will seek to explore the psychological experiences (thoughts, beliefs and early attachment experiences) of a group of overweight

and obese individuals. It is hoped that this information will enhance our understanding of these conditions and lead to the development of more effective treatment interventions.

Why have I been invited?

We are aiming to hear from a total of 170 people (85 men and 85 women) over a 12 month period, who have a BMI of over 25. You have been invited to participate because you are either attending an NHS service for weight management or have identified that you would like to take part in the research through a study advert.

To calculate your BMI and determine whether you are eligible to participate in the study please use the following formula or the NHS BMI calculator at the following website: http://www.nhs.uk/tools/pages/healthyweightcalculator.aspx

Please note you will not be eligible to take part in the study if you are currently pregnant or breastfeeding. The study is also only open to people who are currently living within the UK.

Do I have to take part?

No – it is completely up to you whether or not you wish to take part in this study. Your decision not to take part will in no way affect your treatment if you are currently receiving support from a weight management service, or with any other services you may have contact with.

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

If you decide to take part then you can access the study here. You will initially be asked to complete a participant consent form and following this to provide your contact details, demographic information, and information about your height and weight. You will then be asked to complete a series of 7 questionnaires which ask about your experiences of eating, thoughts and beliefs you hold about yourself, your mood and your early attachment experiences. It is estimated that these questionnaires will take approximately half an hour to complete, but if you are unable to complete all of the questionnaires in one sitting you can return to the study at a later time and pick up from where you last saved your response. Please note that you will need to use the same computer or device to log in each time you do this. If you are one of the first 20 participants to complete the study, you will be asked to complete an additional questionnaire asking for your feedback about your experience of taking part. This feedback will be used to make amendments to the study and improve the process for future participants.

Following completion of the consent form you will be provided with a resource list signposting you to useful local and national sources of support. All participants will also have the option to enter a prize draw. Three prizes will be offered: £10, £15 or £20 of

amazon vouchers. There will be an additional option for the research team to send you a reminder text or email about completing the questionnaires.

The study is designed to be completed online; however, if you are unable to access this please contact the researcher who will arrange for paper copies of the consent form and questionnaires to be sent to you by post. You will be able to complete these by hand and return the completed study questionnaires in a self-addressed envelope provided by the researcher.

Are there any possible benefits in taking part?

There will not be any direct benefit to you from participating in this study. However, it is hoped that your participation will help us in understanding weight gain and maintenance and improve the psychological treatments available in the future to support people who find it difficult to lose weight.

Are there any possible disadvantages or risks from taking part?

Completing the questionnaires may take some participants a significant amount of time to complete. The system has therefore been designed to allow you to log in and complete the questionnaires at a time that is convenient for you, save your progress, and log back in to complete the questionnaires later on if needed.

Some participants may find the content of the questionnaires emotional or distressing. If you find that this is the case then you do not need to complete them. In the rare event that the researcher becomes concerned about a participant's wellbeing, and if you have identified that you are currently under the care of a weight management service in the UK, the researcher may break the participant confidentiality agreement in order to share relevant information with the participant's service and ensure they receive appropriate support (please see the section below for further information).

Will my taking part in the study be kept confidential?

Yes. All information that is collected about you, including all the responses that you give to the questionnaires will be kept completely confidential. Any personal details you provide (i.e. your contact details, demographic details and information about your height and weight) will be stored securely and completely separately from the responses you give to the questionnaires. Please note that some contact information you provide will be kept by Qualtrics (the online platform used to complete the survey) purely for internal purposes such as technical support and notifying users of changes or enhancements to the service.

All participants will be assigned a unique study ID number, so that their responses to the questionnaires remain anonymous but so their data can be traced if required. If you share information that leads to a concern about you, or those around you, the confidentiality

agreement will be broken and relevant information will be passed onto a member of staff within your service to ensure you receive the appropriate support.

Your data will be stored in accordance with the Data Protection Act, and the University of Oxford's policy of Academic Integrity in Research code of practice and procedure and will only be accessible to the research team. Any personal contact details will be destroyed by the researcher three months after the end of the study and any study data (i.e. the anonymised responses participants give to the questionnaires) will be destroyed 5 years after the end of the study. Please note that responsible members of the University of Oxford and the relevant NHS Trust(s) may be given access to data for monitoring and/or audit of the study to ensure that the research is complying with applicable regulations.

Will I be reimbursed for taking part?

As a thank you and recognition for your time you will be entered into a prize draw. There will be three prizes of £10, £15 and £20 of Amazon vouchers. Should you wish to enter this prize draw, your contact details will be kept separately from your questionnaire information and will be destroyed once the prize draw has taken place.

What happens at the end of the study?

The results of the study will be written up by the researcher Esme Banting in part fulfilment of the requirements for a doctoral degree in Clinical Psychology from the University of Oxford. No personal or identifying information will be included in this write up. The findings will also be fed back to relevant weight loss management services and may be published in a peer-reviewed journal. Although you will not receive any immediate feedback about your individual results, a summary sheet explaining the main findings of the study will be made available to all participants who wish to receive this.

What will happen if I don't want to carry on with the study?

If you do decide to take part, you may also choose to withdraw your participation at any time before the study is completed, without the need to give a reason for your decision to do so. Withdrawing participation will in no way affect your treatment if you are currently receiving support from a weight loss management service.

You may withdraw from the study by not completing the online questionnaire, or by contacting the researcher, Esme Banting directly and requesting that the data you have submitted be removed from the study.

What if there is a problem?

The University of Oxford, as Sponsor, has appropriate insurance in place in the unlikely event that you suffer any harm as a direct consequence of your participation in this study.

If you wish to complain about any aspect of the way in which you have been approached or treated during the course of this study, you should contact the researcher's supervisor Myra Cooper (myra.cooper@hmc.ox.ac.uk) or you may contact the University of Oxford Clinical Trials and Research Governance (CTRG) office on 01865 572224, or the head of CTRG, email ctrg@admin.ox.ac.uk.

How have patients and the public been involved in this study?

Service users have helped design and develop this research project and have also been involved in reviewing the Participant Information Sheet. In designing this study we have taken into account service user opinions on the questionnaires that we ask you to complete.

You may find the following links to general information about taking part in research useful:
www.crn.nihr.ac.uk/can-help/patients-carers-public/how-to-take-part-in-a-study/
www.nhs.uk/Conditions/Clinical-trials/Pages/Introduction.aspx

Who is organising and funding the study?

This study is sponsored by Oxford University and is funded by the Oxford Institute of Clinical Psychology Training. It is an educational project undertaken by Esme Banting in part fulfilment of the requirements for a doctoral degree in Clinical Psychology from the University of Oxford.

Who has reviewed the study?

The study has been reviewed and given favourable opinion by the West of Scotland NHS Research Ethics Committee no.5.

Further information and contact details: Please contact Esme Banting by email at: esme.banting@hmc.ox.ac.uk or by telephone on: 07751 585 942.

Thank you for reading this information.

If you would like to participate in the study you may now access the study.

CONSENT FORM IRAS ID: 198873 Investigating the psychological factors associated with being overweight and obese Name of Researcher: Esme Banting

I confirm that I have read the participant information sheet for this study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. (If you agree, please initial box)

I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. (If you agree, please initial box)

I understand who will have access to the data I provide, how this data will be stored, and what will happen to this data at the end of the project. (If you agree, please initial box)

I understand how to raise a concern and make a complaint if required. (If you agree, please initial box)

I agree to participate in this study. (If you agree, please initial box)

Optional: please select option 'yes' or 'no' to the following questions.

I agree to the research team contacting me with reminders to complete the study questionnaires.

Yes (1)

No (2)

If yes, my preferred method of contact is

TEXT (1)

EMAIL (2)

I would like to be included in the prize drawer.

Yes (1)

No (2)

I would like to receive a copy of the summary sheet outlining the findings of the study.

Yes (1)

No (2)

PLEASE NOTE: Your contact details will be stored separately from the responses you give to the questionnaires, so all responses you give will be kept anonymous.

What is your full name? (Please give initials if you would prefer not to disclose your name)

Please provide your preferred telephone number

Do you give permission for the research team to leave a voicemail on the above number?

Yes (1)

No (2)

Please provide your email address

Please provide your postal address

Are you currently receiving support from a Weight Management Service?

Yes (5)

No (6)

If so, which service are you receiving treatment with?

What is your age?

What is your gender?

Male (1)

Female (2)

How would you describe your ethnicity?

White (British) (1)

White (any other White background) (2)

White and Black (Caribbean, African) (3)

White and Asian (4)

Asian/Asian British (5)

Black/African/Caribbean/Black British (6)

Any other ethnic group (7)

What is your current marital status?

Single (1)
Married (2)
Divorced/separated (3)
Widowed (4)
I'd prefer not to say (5)

What is your current employment status?

Full time employed (1)
Part time employed (2)
Unemployed, seeking work (3)
Retired or homemaker (4)
Student (5)
Unemployed, not seeking or unable to work (6)

How many years have you spent in full time education?

Please list any current physical health problems

Please list any current mental health problems

Please list any current medication you are taking

Are you currently considering having bariatric surgery?

Yes (1)
No (2)
Maybe (3)
I have had bariatric surgery already (4)

Are you currently pregnant or breastfeeding?

Yes (1)
No (2)

If Yes Is Selected, Then Skip To End of Survey

What is your current height? (please give in either cm or feet and inches)

In cm (1)
In feet and inches (2)

What is your current weight? (please give in either stones and lbs or kgs)

In stones and pounds (1)

In kilograms (2)

Please provide details of your highest and lowest known weight as an adult (please indicate units in brackets)

Highest known weight as an adult (1)

Lowest known weight as an adult (2)

Listed below are some thoughts which people sometimes have when eating. Please read each thought carefully and decide how much you believe each thought to be true.

Choose the rating which best describes how you usually feel rather than how you feel right now. Select a number on each line for each thought.

	I do not usually believe this at all 0 (1)	10 (2)	20 (3)	30 (4)	40 (5)	50 (6)	60 (7)	70 (8)	80 (9)	90 (10)	I am usually completely convinced that this is true 100 (11)
I'll get fat (1)											
If I don't eat I'll lose control (2)											
My clothes won't fit anymore (3)											
It doesn't matter if I keep eating (4)											
If I eat it will stop the pain (5)											
It's not me doing this (6)											
I'm going to go on getting heavier and heavier (7)											
I deserve something nice (8)											
If I eat it will take away the 'all alone' feeling (9)											
I'll just have a little bit more (10)											
The urge to binge is stronger than my willpower (11)											
I've nothing apart from eating/bingeing in my life (12)											
I'll gain weight (13)											

I've no self control (14)											
If I eat it will comfort me, it's a way of being nice to myself (15)											
I'll hate myself after eating so much (16)											
If I eat it will stop me feeling frightened (17)											
Go on, eat more to punish yourself (18)											
One more bite won't hurt (19)											
I'll have to vomit (exercise, take laxatives) (20)											
If I don't eat then I'll be overwhelmed with distressing thoughts and feelings (21)											
I'll have to go on a strict diet (22)											
If I eat it will all hurt less inside (23)											
If I eat it will stop me feeling bored (24)											
I'll look a mess after eating so much - fat and disgusting (25)											
If I eat it means I don't have to think about unpleasant things (26)											

Listed below are a number of different words. People sometimes think these words describe how they feel about themselves as a person. Please read each word carefully and decide how much you feel each word describes how you feel about your own self. Base your answer on what you emotionally believe or feel to be true, not on what you rationally believe to be true. Choose the rating which best describes what you usually believe/feel or what you believe/feel most of the time rather than how you feel right now. If you are unsure of the meaning of a word you may miss it out. Work as quickly as you can. Don't spend too long on each word - your first impression is the most important. Select a response on each line for each word.

	Feels very much untrue (1)	Feels moderately untrue (2)	Feels slightly untrue (3)	Feels neither true or untrue (4)	Feels slightly true (5)	Feels moderately true (6)	Feels very much true (7)
Abandoned (1)							
Betrayed (2)							
Complaining (3)							
Conscientious (4)							
Demanding (5)							
Deprived (6)							
Disgraceful (7)							
Evil (8)							
Filthy (9)							
Focused (10)							
Goal oriented (11)							
Ill tempered (12)							
Immature (13)							
Inhibited (14)							
Inhuman (15)							
Manipulative (16)							
Meek (17)							
Meticulous (18)							
Misunderstood (19)							
Nasty (20)							
Needy (21)							
Painstaking (22)							
Perfectionistic (23)							
Persistent (24)							
Poisonous (25)							
Possessive (26)							
Putrid (27)							
Repugnant (28)							
Repulsive (29)							
Reserved (30)							
Self-disciplined (31)							
Selfish (32)							
Submissive (33)							
Superficial (34)							
Suspicious (35)							
Unassertive (36)							

Undemonstrative (37)							
Unemotional (38)							
Unreflective (39)							
Vile (40)							

For each item, decide if the item is true about you: never, rarely, sometimes, often or very often. Select the option that corresponds to your rating. Please respond to all items, making sure you select the response that is true about you.

	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Very often (5)
Do you have the desire to eat when you are irritated? (1)					
If food tastes good, do you eat more than usual? (2)					
Do you have a desire to eat when you have nothing to do? (3)					
If you have put on weight, do you eat less than you usually do? (4)					
Do you have a desire to eat when you are depressed or discouraged? (5)					
If food smells and looks good, do you eat more than usual? (6)					
How often do you refuse food or drink offered because you are concerned about your weight? (7)					
Do you have a desire to eat when you are feeling lonely? (8)					

If you see or smell something delicious, do you have a desire to eat it? (9)					
Do you have a desire to eat when somebody lets you down? (10)					
Do you try to eat less at mealtimes than you would like to eat? (11)					
If you have something delicious to eat, do you eat it straight away? (12)					
Do you have a desire to eat when you are cross? (13)					
Do you watch exactly what you eat? (14)					
If you walk past the baker do you have the desire to buy something delicious? (15)					
Do you have a desire to eat when you are approaching something unpleasant to happen? (16)					

Do you deliberately eat foods that are slimming? (17)					
If you see others eating, do you also have the desire to eat? (18)					
When you have eaten too much, do you eat less than usual the following days? (19)					
Do you get the desire to eat when you are worried, anxious or tense? (20)					
Do you find it hard to resist eating delicious foods? (21)					
Do you deliberately eat less in order not to become heavier? (22)					
Do you have a desire to eat when things are going against you or when things have gone wrong? (23)					

If you walk past a snack bar or cafe, do you have the desire to buy something delicious? (24)					
Do you have the desire to eat when you are emotionally upset? (25)					
How often do you try not to eat between meals because you are watching your weight? (26)					
Do you eat more than usual, when you see others eating? (27)					
Do you have a desire to eat when you are bored or restless? (28)					
How often in the evening do you try not to eat because you are watching your weight? (29)					
Do you have a desire to eat when you are frightened? (30)					
Do you take into account your weight with what you eat? (31)					

Do you have a desire to eat when you are disappointed? (32)					
When you are preparing a meal are you inclined to eat something? (33)					

Below is a list of various attitudes and behaviours of parents. As you remember your mother/father in your first 16 years please select the most appropriate option in each column for each question. Please complete each question twice - once for your mother (indicated by the letter M) and once for your father (indicated by the letter F).If someone is substituted as your mother or father please rate the scale for that person. If you did not have a mother or father, leave the appropriate rows blank.

	Very like (1)	Moderately like (2)	Moderately unlike (3)	Very unlike (4)
Spoke to me with a warm and friendly voice (M) (1)				
Spoke to me with a warm and friendly voice (F) (2)				
Did not help me as much as I needed (M) (3)				
Did not help me as much as I needed (F) (4)				
Let me do those things I like doing (M) (5)				
Let me do those things I like doing (F) (6)				
Seemed emotionally cold to me (M) (7)				
Seemed emotionally cold to me (F) (8)				
Appeared to understand my problems and worries (M) (9)				
Appeared to understand my problems and worries (F) (10)				
Was affectionate to me (M) (11)				
Was affectionate to me (F) (12)				
Liked me to make my own decisions (M) (13)				
Liked me to make my own decisions (F) (14)				

Did not want me to grow up (M) (15)				
Did not want me to grow up (F) (16)				
Tried to control everything that I did (M) (17)				
Tried to control everything that I did (F) (18)				
Invaded my privacy (M) (19)				
Invaded my privacy (F) (20)				
Enjoyed talking things over with me (M) (21)				
Enjoyed talking things over with me (F) (22)				
Frequently smiled at me (M) (23)				
Frequently smiled at me (F) (24)				
Tended to baby me (M) (25)				
Tended to baby me (F) (26)				
Did not seem to understand what I needed or wanted (M) (27)				
Did not seem to understand what I needed or wanted (F) (28)				
Let me decide things for myself (M) (29)				
Let me decide things for myself (F) (30)				

Made me feel I wasn't wanted (M) (31)				
Made me feel I wasn't wanted (F) (32)				
Could make me feel better when I was upset (M) (33)				
Could make me feel better when I was upset (F) (34)				
Did not talk with me very much (M) (35)				
Did not talk with me very much (F) (36)				
Tried to make me dependent on him/her (M) (37)				
Tried to make me dependent on him/her (F) (38)				
Felt I could not look after myself unless she/he was around (M) (39)				
Felt I could not look after myself unless she/he was around (F) (40)				
Gave me as much freedom as I wanted (M) (41)				
Gave me as much freedom as I wanted (F) (42)				
Let me go out as often as I wanted (M) (43)				
Let me go out as often as I wanted (F) (44)				

Was overprotective of me (M) (45)				
Was overprotective of me (F) (46)				
Did not praise me (M) (47)				
Did not praise me (F) (48)				
Let me dress in any way I pleased (M) (49)				
Let me dress in any way I pleased (F) (50)				

Please select a response for how much each of the following statements applies to you:

	Always (1)	Usually (2)	Often (3)	Sometimes (4)	Rarely (5)	Never (6)
I am terrified about being overweight (1)						
I avoid eating when I am hungry (2)						
I find myself preoccupied with food (3)						
I have gone on eating binges where I feel that I may not be able to stop (4)						
I cut my food into small pieces (5)						
I am aware of the calorie content of foods that I eat (6)						
I particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes etc.) (7)						
I feel that others would prefer if I ate more (8)						
I vomit after I have eaten (9)						
I feel extremely guilty after eating (10)						
I am occupied with a desire to be thinner (11)						

I think about burning up calories when I excercise (12)						
Other people think I am too thin (13)						
I am preoccupied with the thought of having fat on my body (14)						
I take longer than others to eat my meals (15)						
I avoid foods with sugar in them (16)						
I eat diet foods (17)						
I feel that food controls my life (18)						
I display self-control around food (19)						
I feel that others pressure me to eat (20)						
I give too much time and thought to food (21)						
I feel uncomfortable after eating sweets (22)						
I engage in dieting behaviour (23)						

I like my stomach to be empty (24)						
I have the impulse to vomit after meals (25)						
I enjoy trying new rich foods (26)						

Listed below are different attitudes and beliefs which people sometimes hold. Please read each statement carefully and decide how much you agree or disagree with the statement. Base your answer on what you emotionally believe or feel, not on what you rationally believe to be true. Choose the rating which best describes what you usually believe or what you believe most of the time rather than how you feel right now. Please select one option for each statement.

	I do not usually believe this at all 0 (1)	10 (2)	20 (3)	30 (4)	40 (5)	50 (6)	60 (7)	70 (8)	80 (9)	90 (10)	I am usually completely convinced that this is true 100 (11)
I'm unlovable (1)											
If my flesh is firm I'm more attractive (2)											
I'm ugly (3)											
I'm useless (4)											
I'm a failure (5)											
If I eat a forbidden food I won't be able to stop (6)											
If my stomach is flat I'll be more desirable (7)											
If I lose weight I'll count more in the world (8)											
If I eat desserts or puddings I'll get fat (9)											
If I stay hungry I can guard against losing control and getting fat (10)											
I'm all alone (11)											

If I eat bad foods such as fats, sweets, bread and cereals they will turn into fat (12)											
I'm no good (13)											
If I eat normally I'll gain weight (14)											
If I eat three meals a day like other people I'll gain weight (15)											
If I've eaten something I have to get rid of it as soon as possible (16)											
I'm not a likeable person (17)											
If my hips are thin people will approve of me (18)											
If I lose weight people will be friendly and want to get to know me (19)											
If I gain weight it means I'm a bad person (20)											

If my thighs are firm it means I'm a better person (21)											
I don't like myself very much (22)											
If I gain weight I'm nothing (23)											
If my hips are narrow it means I'm successful (24)											
If I lose weight people will care about me (25)											
If my body shape is in proportion people will love me (26)											
I'm dull (27)											
If I binge and vomit I can stay in control (28)											
I'm stupid (29)											
If my body is lean I can feel good about myself (30)											
Of my bottom is small people will take me seriously (31)											
Body fat/flabbiness is disgusting (32)											

For each statement below please select the response that best applies to you:

	Most of the time (1)	A lot of the time (2)	Time to time, occasionally (3)	Not at all (4)
I feel tense or 'wound up' (1)				
I still enjoy the things I used to enjoy (2)				
I feel sort of frightened as if something awful is about to happen (3)				
I can laugh and see the funny side of things (4)				
Worrying thoughts go through my mind (5)				
I feel cheerful (6)				
I can sit at ease and feel relaxed (7)				
I feel as if I am slowed down (8)				
I get a sort of frightened feeling like 'butterflies' in the stomach (9)				
I have lost interest in my appearance (10)				
I feel restless as if I have to be on the move (11)				
I look forward with enjoyment to things (12)				
I get sudden feelings of panic (13)				
I can enjoy a good book or radio or TV show (14)				

Thank you for completing this study that is seeking to investigate the psychological factors associated with being overweight and obese.

If you feel that you require further support following your participation in this study, please contact your GP as they will be able to refer you on to the most appropriate service.

If you feel that you require more urgent help or support, or if you feel at risk to yourself or others, please contact your local accident and emergency department or the Samaritans who are available 24 hours a day, 7 days a week on: 08457 90 90 90.

Please also find below a number of other contact details and resources that may be useful.

BEAT The UK's leading charity supporting anyone affected by eating disorders or difficulties with food, weight and shape. Helpline: 0345 634 1414 Website: b-eat.co.uk

MIND (National Association for Mental Health) Mindinfoline: 0845 766 0163 Website: www.mind.org.uk Email: info@mind.org.uk

Self Help Books

Cooper, M., Todd, G. & Wells, A. (2001). Bulimia Nervosa: A client's Guide to Cognitive Therapy. London: Jessica Kingsley.
Fairburn, C. G. (1995).

Overcoming Binge Eating. New York: Guildford. Freeman, C. (2000). Getting better Bit(e) by Bit(e). London: Psychology Press.

Mind over Mood, by Christine Padesky & Dennis Greenberger (1995). Guildford Press

Manage your mind: The Mental Fitness Guide, by Gillian Butler and Tony Hope (2007). Oxford University Press.

The following questions will ask about your overall experience of completing the online questionnaire.

The feedback you give may be used by the researcher to make changes to the study if necessary. Please answer these questions openly and honestly. All responses will remain anonymous and will be kept completely confidential.

1. How long did the online questionnaires take for you to complete?

- 0-5 minutes (1)
- 5-10 minutes (2)
- 10-15 minutes (3)
- 15-20 minutes (4)
- 20-25 minutes (5)
- 25-30 minutes (6)
- Over 30 minutes (7)

I was happy with the amount of time taken to complete these questionnaires

- Strongly agree (1)
- Agree (2)
- Neither agree nor disagree (3)
- Disagree (4)
- Strongly disagree (5)

Please describe your experience of the time taken to complete these questionnaires

How would you rate your overall experience of completing these questionnaires?

- Negative experience (1)
- Neutral experience (2)
- Positive experience (3)

Please provide further details if relevant

How would you rate the way that the questionnaires were presented, e.g. the format of questions, the order you completed them in, the way they appeared on screen etc.

- Very poor (1)
- Poor (2)
- Average (3)
- Good (4)
- Very good (5)

Would you recommend making any specific changes to improve the presentation of the questionnaires?

Appendix K

Useful information sheet for participants

Thank you for completing this study that is seeking to investigate the psychological factors associated with weight gain and obesity.

If you feel that you require further support following your participation in this study, please contact your GP as they will be able to refer you on to the most appropriate service.

If you feel that you require more urgent help or support, or if you feel at risk to yourself or others, please contact your local accident and emergency department or the Samaritans who are available 24 hours a day, 7 days a week on: 08457 90 90 90.

Please also find below a number of other contact details and resources that may be useful.

BEAT

The UK's leading charity supporting anyone affected by eating disorders or difficulties with food, weight and shape.

Helpline: 0345 634 1414 Website: b-eat.co.uk

MIND (National Association for Mental Health)

Mindinfoline: 0845 766 0163 Website: www.mind.org.uk Email: info@mind.org.uk

Self Help Books

Cooper, M., Todd, G. & Wells, A. (2001). Bulimia Nervosa: A client's Guide to Cognitive Therapy. London: Jessica Kingsley.
Fairburn, C. G. (1995).

Overcoming Binge Eating. New York: Guildford. Freeman, C. (2000).

Getting better Bit(e) by Bit(e). London: Psychology Press.

Mind over Mood, by Christine Padesky & Dennis Greenberger (1995). Guildford Press
Manage your mind: The Mental Fitness Guide, by Gillian Butler and Tony Hope (2007). Oxford University Press.

Appendix L

Sponsorship, ethical and course approval letters

Oxford Health NHS
NHS Foundation Trust

The Oxford Institute of Clinical Psychology Training

Oxford Doctoral Course in Clinical Psychology
An NHS Course validated by the University of Oxford
Isis Education Centre, Warneford Hospital, Oxford OX3 7JX
Tel: +44(0)1865 226431
Website: www.oxicpt.co.uk

1st February, 2016

Esme Banting
Trainee Clinical Psychologist
Oxford Doctoral Course in Clinical Psychology
Isis Education Centre

Dear Esme,

Thank you for your response to the queries raised by the Research Sub Committee. I am pleased to say that you now have approval for your dissertation project.

We wish you all the very best with your work.

With all best wishes

Yours sincerely,

Dr Myra Cooper
Chair, Research Sub-Committee

c.c. Charlie Wykes
Alison Griffiths

RESEARCH SERVICES
Clinical Trials and Research Governance
Joint Research Office
Block 60
Churchill Hospital
Headington
Oxford
OX3 7LE

To whom it may concern

Date: 23/05/2016

Dear Sir/Madam,

Title: An investigation of early attachment experiences and the application of a cognitive model of Bulimia Nervosa in a clinically obese population.

PID: 11981

Protocol Date/Version: 19.05.2016 Version 1.0

The above study has been designed by Miss Esme Banting and colleagues at the University of Oxford and funded by Departmental Resources (Internal Funding). I confirm that the University will accept the role of Research Sponsor of this Study and will comply with the requirements of the Department of Health Research Governance Framework for Health and Social Care 2005, in so far as these apply in the United Kingdom.

Insurance-provided indemnity arrangements are in place for the project:
Newline Underwriting Management Ltd., at Lloyd's of London.

Sponsorship is confirmed subject to the condition that the following are sent to Clinical Trials and Research Governance for review prior to submission to the Research Ethics Committee. Failure to do so may compromise insurance cover for the project.

- Any substantial amendment
- Any extension to the study end date
- Addition of any new research site or patient identification centre

In addition, annual progress reports must be copied to Clinical Trials and Research Governance.

Any communications relating to Research Sponsorship should be directed to the undersigned, whose contact details are given in this letter.

Yours faithfully

E. Chick

Elaine Chick
Deputy Head of Clinical Trials and Research Governance

Tel: +44 (0)1865 572221 · Fax: +44 (0)1865 572228 · Web: www.admin.ox.ac.uk/researchsupport/ctrg/
Email: Heather.house@admin.ox.ac.uk or Elaine.Chick@admin.ox.ac.uk

NHS
Greater Glasgow and Clyde
WoSRES

West of Scotland Research Ethics Service

Miss Esme Banting
Trainee Clinical Psychologist

Oxford Health NHS Foundation Trust

Oxford Institute of Clinical Psychology Training
Isis Education Centre
Warneford Hospital
Headington
Oxford
OX3 7JX

West of Scotland REC 5

West of Scotland Research Ethics Service West Glasgow Ambulatory Care Hospital Dalnair Street Glasgow

Please note: This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

Dear Miss Banting

Study title: An investigation of early attachment experiences and the application of a cognitive model of Bulimia Nervosa in a clinically obese population.
16/WS/0115
198873

The Proportionate Review Sub-committee of the West of Scotland REC 5 reviewed the above application on 01 June 2016.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact the REC Manager Mrs Sharon Macgregor, WoSREC5@ggc.scot.nhs.uk. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Ethical opinion

On behalf of the Committee, the sub-committee gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

G3 8SW Date

Direct line E-mail

03 June 2016

0141 232 1809 WoSREC5@ggc.scot.nhs.uk

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

• The Committee made a **suggestion only** regarding the participant information sheet and this is noted below in the summary of discussion. Please note that this is not a condition of approval.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA Approval (England)/ NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion").

Summary of discussion at the meeting

Informed consent process and the adequacy and completeness of participant information

As a suggestion only, the language in the participant information sheet, particularly in the first paragraph, is a little difficult and may decrease the number of people willing to take part. It is merely a suggestion that the researcher make it a little more user friendly.

If the researchers do decide to make changes to the document, an amendment should be submitted to the Committee for review.

Approved documents

The documents reviewed and approved were:

Document	*Version*	*Date*
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [More Life Indemnity Insurance]		05 May 2015
IRAS Application Form [IRAS_Form_25052016]		25 May 2016
Letter from funder [Confirmation of funding]		24 February 2016
Letter from sponsor [Sponsorship letter]		23 May 2016
Letters of invitation to participant [Study Invite Letter]	V1.0	19 May 2016
Non-validated questionnaire [Contact details questionnaire]	V1.0	19 May 2016
Non-validated questionnaire [Demographic details questionnaire]	V1.0	19 May 2016
Non-validated questionnaire [Height and weight questionnaire]	V1.0	19 May 2016
Non-validated questionnaire [Patient experience questionnaire (PEQ)]	V1.0	19 May 2016
Other [Useful information and resource list]	V1.0	19 May 2016
Other [Email and SMS reminder template]	V1.0	19 May 2016
Other [Preview of online questionnaires]		23 May 2016
Participant consent form [Consent Form Online Version]	V1.0	19 May 2016

Participant consent form [Consent form paper version]	V1.0	19 May 2016
Participant information sheet (PIS) [Participant Information Sheet]	V1.0	19 May 2016
Research protocol or project proposal [Study Protocol]	V1.0	19 May 2016
Summary CV for Chief Investigator (CI) [CV]		24 February 2016
Summary CV for supervisor (student research) [Myra Cooper CV]		
Summary CV for supervisor (student research) [Charlie Wykes CV]		09 April 2016
Summary CV for supervisor (student research) [Alison Griffiths CV]		
Validated questionnaire [EDTQ]		
Validated questionnaire [EDBQ]		
Validated questionnaire [EDCBQ]		
Validated questionnaire [DEBQ]		
Validated questionnaire [PBI]		
Validated questionnaire [EAT-26]		
Validated questionnaire [HADS]		

Membership of the Proportionate Review Sub-Committee

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

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.

After ethical review

Reporting requirements

The attached document “After ethical review – guidance for researchers” gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments

- Adding new sites and investigators

- Notification of serious breaches of the protocol

- Progress and safety reports

- Notifying the end of the study

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

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality- assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee’s best wishes for the success of this project.

16/WS/0115 Please quote this number on all correspondence

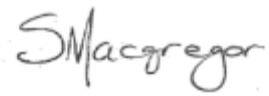
Yours sincerely

for

Canon Matt McManus Chair

Enclosures: List of names and professions of members who took part in the review “After ethical review – guidance for researchers”

Copy to: Ms Heather House, University of Oxford
Ms Vicky Rush, Oxford Health NHS Foundation Trust



West of Scotland REC 5
Attendance at PRS Sub-Committee of the REC meeting on 01 June 2016

Committee Members:

Also in attendance:

Name	*Profession*	*Present*	*Notes*
Dr Gillian Harold	Consultant Radiologist	Yes	
Dr Ahmed Khan	Consultant Psychiatrist	Yes	
Canon Matt McManus	Parish Priest (Vice-Chair)	Yes	In the Chair

Name	*Position (or reason for attending)*
Mrs Sharon Macgregor	Co-ordinator

WoSRES
West of Scotland Research Ethics Service

NHS
Greater Glasgow and Clyde

West of Scotland REC 5
West of Scotland Research Ethics Service
West Glasgow Ambulatory Care Hospital
Dalnair Street
Glasgow
G3 8SW

Miss Esme Banting
Trainee Clinical Psychologist
Oxford Health NHS Foundation Trust
Oxford Institute of Clinical Psychology Training
Isis Education Centre, Warneford Hospital
Headington, Oxford
OX3 7JX

Date 21 December 2016

Direct line 0141 232 1809
E-mail WoSREC5@ggc.scot.nhs.uk

Dear Miss Banting

Study title: **An investigation of early attachment experiences and the application of a cognitive model of Bulimia Nervosa in an overweight/obese population.**
REC reference: **16/WS/0115**
Amendment number: **1 (AM02)**
Amendment date: **02 November 2016**
IRAS project ID: **198873**

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*
Copies of advertisement materials for research participants [Electronic study advert]	2	02 November 2016
Copies of advertisement materials for research participants [Physical poster]		
Letters of invitation to participant	2	02 November 2016
Non-validated questionnaire [Demographic]	2	02 November 2016
Non-validated questionnaire [Contact details]	2	02 November 2016
Notice of Substantial Amendment (non-CTIMP)	1 (AM02)	02 November 2016
Other [Email and SMS reminder]	2	02 November 2016
Other [Useful information and resources list]	2	02 November 2016
Participant consent form [Paper version]	2	02 November 2016
Participant consent form [Online version]	2	02 November 2016
Participant information sheet (PIS)	3	02 November 2016
Research protocol or project proposal	2	02 November 2016

Appendix M

Kolmogorov-Smirnov tests of normality

Kolmogorov-Smirnov tests were used to check variables for normality of distribution.

The results of these tests are displayed in table 1.

Table 1: Kolmogorov-Smirnov test of normality of distribution

Variable	**Kolmogoro-Smirnov (D)** **P<.001***; p<.01**; P<.05***
BMI	.128***
Age	.125***
Gender: **Male** **Female**	.511*** .171 .124***
Employment status: **Employed** **Unemployed**	 .116*** .128
EDTQ: **Negative thoughts** **Positive thoughts** **Permissive thoughts**	 .058 .167*** .071*
EDCBQ: **Self loathing** **Unassertive/inhibited** **Demanding/needing help** **Abandoned/isolated** **High Standards for Self**	 .205*** .065 .074* .104*** .112***
EDBQ: **Negative self-beliefs** **Acceptance by others** **Self acceptance** **Control over eating**	 .090** .100*** .092** .086*
PBI: **Maternal care** **Paternal care** **Maternal over protection**	 .135*** .098*** .103***

Paternal overprotection	.070*

BMI = Body Mass Index
EDTQ = Eating Disorder Thoughts Questionnaire
EDCBQ = Eating Disorder Core Belief Questionnaire
EDBQ = Eating Disorder Belief Questionnaire
PBI = Parental Bonding Instrument

Appendix N

Theoretical rationale for the creation of combination variables

Systematic reviews and meta-analyses have reported significant associations between depression, overweight and obesity (Luppino et al., 2010). Evidence from cross-sectional (e.g. de Wit et al., 2009; Faith, Matz, & Jorge, 2002; Scott et al., 2008) and longitudinal research studies (e.g. Herva et al., 2006; Roberts et al., 2000) suggests there is a reciprocal relationship between these variables, in both men and women. A positive association has also been reported between obesity and anxiety disorders, including post-traumatic-stress disorder and social phobia (see Gariepy, Nitka, & Schmitz, 2010 for a systematic review and meta-analysis); however, the authors of this review note that a causal relationship could not be inferred from the available data. Eating disorder symptoms including binge eating (de Zwaan, 2001) and dietary restraint (Stunkard, 1990; Lluch et al., 2000) have also been associated with higher BMI in overweight and obese populations.

Given these findings, it was expected that both mood and eating disorder symptoms would have an effect on BMI, together with the variables of interest in this study. To account for this combined effect, mood and eating disorder variables were combined to form a new variable. In order to do this, the researcher first used Spearman's correlations to confirm that mood and eating disorder variables were positively correlated. The mood variables, assessed in this study using the Hospital Anxiety and Depression Scale (Zigmond & Snaith, 1983), and eating disorder symptoms, assessed using a combination of the Eating Attitudes Test-26 (Garner, Olmsted, Bohr, &

Garfinkel, 1982) and the Dutch Eating Behaviour Questionnaire restraint subscale (Van Strien, Frijters, Bergers, & Defares, 1986) were then combined to form a new variable (mood x eating disorder symptoms), and this variable, was combined with the variables of interest as specified in the study hypotheses, to determine the relationship of these factors to BMI.

Appendix O

Comparison of participants who were recruited online and from weight management services

A total of 29 participants (mean age = 42.4) reported that they were currently seeking treatment from a weight management service. A total of 121 participants (mean age = 37.6) reported that they were not currently seeking treatment from a weight management service, suggesting they were therefore recruited via online advertising. A total of 12 participants did not provide information on whether they were currently seeking treatment from a weight management service.

Mann Whitney U tests were used to compare the demographic characteristics (age, gender, ethnicity, marital status and years spent in education) of participants who were and were not seeking treatment from a weight management service.

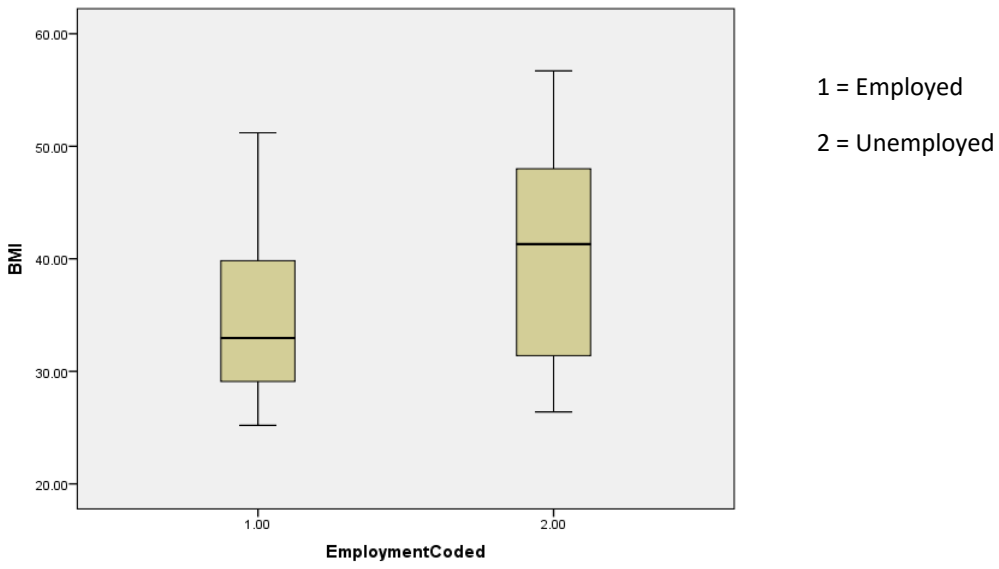
The BMI of participants who were seeking treatment from a weight management service was significantly higher (*Mdn* = 42.1) than participants who were not seeking treatment (*Mdn* = 32.3), $U = 833.5$, $Z = -4.383$, $p < .001$. No other significant differences were observed between these groups.

Appendix P

Preliminary analyses on distribution of BMI

Mann Whitney U tests were conducted to determine whether there were significant differences in BMI relating to the demographic variables. There were no significant differences in BMI in relation to gender, $U = 1399$, $z = -1.453$, $p = .146$; ethnicity, $U = 525.5$, $z = -1.632$, $p = .103$; marital status, $U = 2722.5$, $z = -1.171$, $p = .242$ or years in education, $U = 1878$, $z = -1.214$, $p = .225$. There was however, a significant difference in BMI between employed and unemployed participants in this sample. Participants who were unemployed had a significantly higher BMI (*Mdn* = 41.3) than participants who were employed (*Mdn* = 32.96), $U = 1337$, $z = -3.555$, $p < .001$. The group differences in BMI between employed and unemployed participants are presented in figure 1.

Figure 1: Box plot showing group differences in BMI between employed and unemployed participants



Spearman's correlations were used to investigate whether age was significantly correlated with BMI, for both the employed and unemployed samples. No significant correlations were found between age and BMI in the employed sample, $r_s = .055$, $n = 126$, $p = .543$ or the unemployed sample, $r_s = .313$, $n = 35$, $p = .067$.

Appendix Q

Comparison of employed and unemployed participants

Mann Whitney *U* tests were conducted to determine whether there were significant differences between employed and unemployed participants on the eating disorder thoughts, core belief and attachment measures completed.

Findings

Eating disorder thoughts

Unemployed participants had significantly higher scores on the EDTQ subscale positive thoughts (*Mdn* = 27) than employed participants (*Mdn* = 10), *U* = 1540.5, *z* = -2.735, *p* = .006.

Core beliefs

Unemployed participants had higher scores on the EDBQ subscale negative self-beliefs (*Mdn* 47) than employed participants (*Mdn* = 28.5) *U* = 1413, *z* = -3.247, *p* = .001. Unemployed participants had significantly higher scores on the core belief subscales self-loathing, unassertive/inhibited, demanding/needing help and abandoned isolated. Employed participants scored significantly higher on the core belief subscale high standards for self (see Table 2).

Table2: Mann Whitney U test statistics for employed and unemployed participants

EDCBQ subscale	**Employed (*Mdn*)**	**Unemployed (*Mdn*)**	***U***	***Z***	***p***
Self-loathing	0.45	1.3	1434.5	-3.181	.001
Unassertive/inhibited	1.625	2.5	1412.5	-3.251	.001
Demanding/needing help	2.0	2.6	1584	-2.544	.011
Abandoned/isolated	1.75	3.25	1253.5	-3.91	.0001
High standards for self	3.75	3.0	1522	-2.801	.005

EDCBQ = Eating Disorder Core Belief Questionnaire

Attachment

On the PBI subscale paternal care, employed participants scored significantly higher (*Mdn* = 27.0) than unemployed participants (*Mdn* = 20). *U* = 1334, *z* = -3.57, *p* = .000. Whereas on the PBI subscale paternal overprotection, unemployed participants scored significantly higher (*Mdn* = 16) than employed (*Mdn* = 11.5) *U* = 1434, *z* = -3.163, *p* = .002.

Spearman's correlations were then used to compare the relationship of these variables with BMI.

Findings

In the employed sample, a positive correlation was observed between BMI and the EDTQ positive thoughts subscale r_s= .177, n = 126, p =.024. However, no significant correlations were found between these variables and BMI in the unemployed sample. These findings need to be interpreted with caution due to the unequal sample sizes between the employed and unemployed sample.

The lack of significant correlations found between BMI and the cognitive and attachment variables in the unemployed sample may have been due to the small number of unemployed participants recruited into the study (and the smaller range in BMI within this sample). It is possible that more significant relationships would have emerged with a larger number of unemployed participants.

Appendix R

Personal reflection on the dissertation

This research project has given me an insight into some of the challenges and complexities of conducting research within real life NHS settings. I have been humbled and inspired by the kindness of my Clinical Psychology colleagues across the country who expressed such enthusiasm and interest in my project! However, despite the very best of intentions, overburdened and under-resourced teams meant that recruiting for my research project (on top of all the existing demands on services) was not a priority and recruiting participants from weight management services was therefore incredibly challenging.

The attempt to involve NHS participants was also made challenging by the stringent demands of various ethics committees and Research and Development (R&D) teams. Whilst it is of course of upmost importance to ensure that any research involving patients is ethically sound, I found the task of having to repeat my aims, rationale and planned processes in multiple different ways to fit the requirements nearly a dozen NHS Trusts to be somewhat laborious. Furthermore, the time taken by many (again probably overstretched) R&D teams to approve my study meant that only a handful of clinical participants were eventually recruited.

Despite priding myself on being a very organised Trainee I therefore found myself half way through the dissertation process making the challenging decision to extend my study to non-clinical participants and re-applying for ethical approval to advertise the study online. Whilst I am glad that I have had this experience as I now feel more confident in my ability to negotiate this process in the future, I have also reflected

on how daunting and out of my own hands this process has felt. I see now that other clinicians may be deterred from conducting research with clinical populations for similar reasons and worry that those who might benefit most from the outcomes of research may therefore miss out.

My journey to becoming a Clinical Psychologist (both prior to and throughout training) has taught me a lot about my own resilience. I have reflected on my dislike of uncertainty and the anxiety I experience when things are out of my control. The nature of research means however, that I have had to find effective ways to manage this anxiety and I have been able to use my organisation skills, creativity and resourcefulness to produce a research project that I am proud of.

Working clinically in the same field as the population of study in my research project has been a helpful experience that has led me to reflect on my own journey and development throughout training. Starting the project in year two of the course my aims were heavily influenced by my prior interest and experience in Cognitive Behavioural Therapy (CBT). In later placements I found an affinity with the theory and principles of the third wave CBT approach Acceptance and Commitment Therapy (ACT) in part, because of how helpful I have found this to be when working clinically with an obese client group. At times I have felt that these two approaches are at odds with each other in the way they view the impact of cognitions on an individual's emotions and behaviour and how best to effectively approach this. I have therefore had to work hard within myself to integrate these two approaches and to hold a 'both and' rather than 'either or' stance. This is something I very much strive to do in my work as a Clinical Psychologist more generally and I hope always to work in a formulation driven, person

centred and integrative way. It has been interesting to ponder over how different my research questions might have been had I gained experience of ACT earlier on. I believe it is important for clinicians and researchers to be reflexive about their own interests and experiences as it is possible that these may shape and otherwise bias their work.

ACT encourages therapists to embody its therapeutic principles and I found myself regularly practicing mindfulness and defusion to cope with the stresses of completing the dissertation. In particularly challenging moments re-connecting with my value of helping others through using scientific methods to enhance our understanding of obesity has really motivated me and kept me feeling passionate and inspired. For this to my ACT placement supervisors I am very thankful.

Obesity has been my area of interest now for a long time and having the opportunity to work in a Bariatric Surgery and Weight Management Service for my specialist placement has affirmed my desire to pursue a career in this field. One of the things I am most often struck by is the impact that the stigma of being obese has, not only at an individual level (e.g. on an individual's mood and ability to engage in meaningful activities) but at a wider systemic level through the inequalities in healthcare provision and access I have witnessed. I believe that one of the most important ways we can help to reduce this stigma is by enhancing the understanding and awareness of the complex factors that contribute to obesity. Whilst medical research continues to enhance our understanding of the biological factors that influence weight gain, I believe the psychological factors associated with obesity remain poorly understood and this is something I very much hope to be able to continue to contribute to throughout my career.

References for Appendices

Barker, C. (2017). *Briefing Paper number 3336: Obesity Statistics*. House of Commons. Retrieved from http://researchbriefings.parliament.uk/ResearchBriefing/Summary/SN03336#fullreport.

British Psychological Association. (2007). *Report of Working party on conducting research on the internet: Guidelines for Ethical Practice in Psychological Research Online*. Leicester: BPS.

British Psychological Society. (2014). *Ethical Guidelines; Guidelines for Minimum Standards of Ethical Approval in Psychological Research*. Leicester: BPS.

Bruch, H. (1961). Transformation of oral impulses in eating disorders: A conceptual approach. *Psychiatric Quarterly*, *35*, 458-481.

Bruch, H. (1973). *Eating disorders: Anorexia nervosa, obesity and the person within*. New York: Basic Books.

Butland, B., Jebb, S., Kopelman, P., McPherson, K., Thomas, S., Mardell, J., & Parry, V. (2007). Foresight. Tackling obesities: future choices. Project report. *Foresight. Tackling obesities: future choices. Project report.*

Cooper, M. J. (1997). Cognitive therapy of anorexia nervosa and bulimia nervosa: a review. *Behavioural and Cognitive Psychotherapy, 25,* 113-145.

Cooper, M. J. (2005). Cognitive therapy in anorexia nervosa and bulimia nervosa: Progress, development and future directions. *Clinical Psychology Review, 25,* 511-533.

Cooper, M., Cohen-Tovée, E., Todd, G., Wells, A., & Tovée, M. (1997). The eating disorder belief questionnaire: Preliminary development. *Behaviour Research and Therapy*, *35*, 381-388.

Cooper, M., & Hunt, J. (1998). Core beliefs and underlying assumptions in bulimia nervosa and depression. *Behaviour Research and Therapy*, *36*, 895-898.

Cooper, M. J., Todd, G., and Wells, A. (2009). *Cognitive Therapy for Bulimia Nervosa.* London: Taylor & Francis.

Cooper, M. J., Todd, G., Woolrich, R., Somerville, K., & Wells, A. (2006). Assessing eating disorder thoughts and behaviors: The development and preliminary evaluation of two questionnaires. *Cognitive Therapy and Research*, *30*, 551-570.

Cooper, M. J., Wells, A., & Todd, G. (2004). A cognitive model of bulimia nervosa. *British Journal of Clinical Psychology*, *43*, 1-16.

Cooper, J. L., Morrison, T. L., Bigman, O. L., Abramowitz, S. I., Levin, S., & Krener, P. (1988). Mood changes and affective disorder in the bulimic binge—purge cycle. *International Journal of Eating Disorders*, *7*, 469-474.

Cooper, Z., Doll, H. A., Hawker, D. M., Byrne, S., Bonner, G., Eeley, E., & Fairburn, C. G. (2010). Testing a new cognitive behavioural treatment for obesity: A randomized controlled trial with three-year follow-up. *Behaviour Research and Therapy*, *48*, 706-713.

Cooper, Z., Fairburn, C. G., & Hawker, D. M. (2003). *Cognitive-Behavioral Treatment of Obesity.* New York: Guilford Press.

Craig, R., & Shelton, N. (2007). *The Health Survey for England 2007*. TSO. Retrieved from http://content.digital.nhs.uk/catalogue/PUB00415/heal-surv-life-know-atti-beha-eng-2007-rep-v2.pdf

Department of Health. (2008). *Healthy weight, healthy lives: a cross-government strategy for England*. Department of Health. Retrieved from http://webarchive.nationalarchives.gov.uk/20100408082121/http://www.

dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/documents/digitalasset/dh_084024.pdf

de Wit, L. M., van Straten, A., van Herten, M., Penninx, B. W., & Cuijpers, P. (2009). Depression and body mass index, a u-shaped association. *BMC Public Health*, *9*, 14.

de Zwaan, M. (2001). Binge eating disorder and obesity. *International Journal of Obesity*, *25*, 51-55.

Elmore, D. K., & de Castro. J. M. (1990). Self-rated moods and hunger in relation to spontaneous eating behavior in bulimics, recovered bulimics, and normal. *International Journal of Eating Disorders, 9,* 179–190.

Faith, M. S., Matz, P. E., & Jorge, M. A. (2002). Obesity-depression associations in the population. *Journal of Psychosomatic Research*, *53*, 935-942.

Field, A. E., Coakley, E. K., Must, A., Spadano, J. L., Laird, N., Dietz, W. H., Colditz, G. A. (2001). Impact of overweight on the risk of developing common chronic diseases during a 10-year period. *Arch Intern Med*. *161*, 1581–1586.

Fontaine, K. R., Redden, D. T., Wang, C., Westfall, A. O., & Allison, D. B. (2003). Years of Life Lost Due to Obesity. *Journal of the American Medical Association, 289*, 187–93.

Gariepy, G., Nitka, D., & Schmitz, N. (2010). The association between obesity and anxiety disorders in the population: a systematic review and meta-analysis. *International Journal of Obesity, 34*, 407-419.

Garner, D. M., Olmsted, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The eating attitudes test: psychometric features and clinical correlates. *Psychological Medicine*, *12*, 871-878.

Garner, D. M., & Wooley, S. C. (1991). Confronting the failure of behavioral and dietary treatments for obesity. *Clinical Psychology Review*, *11*, 729-780.

Goldfein, J. A., Walsh, B. T., & Midlarsky, E. (2000). Influence of shape and weight on self-evaluation in bulimia nervosa. *International Journal of Eating Disorders*, *27*, 435-445.

Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, *110*, 86-108.

Herva, A., Laitinen, J., Miettunen, J., Veijola, J., Karvonen, J. T., Laksy, K., & Joukamaa, M. (2006). Obesity and depression: results from the longitudinal Northern Finland 1966 Birth Cohort Study. *International Journal of Obesity, 30*, 520-527.

Hsu, L. K. G. (1990). *Eating Disorders.* New York: Guilford Press.

Kaplan, H. I., & Kaplan, H. S. (1957). The psychosomatic concept of obesity. *Journal of Nervous and Mental Disease, 125,* 181-201.

Kaye, W. H., Gwirtsman, H. E., George, D. T., Weiss, S. R., & Jimerson, D. C. (1986). Relationship of mood alterations to bingeing behaviour in bulimia. *The British Journal of Psychiatry*, *149*, 479-485.

Kopelman, P. (2007). Health Risks Associated with Overweight and Obesity. *Obesity Reviews*, *8*, 13-17.

Leon, G. R., & Roth, L. (1977). Obesity: Psychological causes, correlations, and speculations. *Psychological Bulletin*, *84*, 117-139.

Leung, N., Waller, G., & Thomas, G. (1999). Core beliefs in anorexic and bulimic women. *The Journal of Nervous and Mental Disease*, *187*, 736-741.

Lluch, A., Herbeth, B., Mejean, L., & Siest, G. (2000). Dietary intakes, eating style and overweight in the Stanislas Family Study. *International Journal of Obesity*, *24*, 1493-1499.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, H., Brenda, W. J. H., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of General Psychiatry*, *67*, 220-229.

National Institute for Health and Social Care Excellence. (2006). C*linical Guideline 43. Obesity Prevention*. National Institute for Health and Social Care Excellence. Retrieved from https://www.nice.org.uk/guidance/cg43.

Puhl, R. M., & Heuer, C. A (2009). The stigma of obesity: a review and update. *Obesity*, *17*, 941-964.

Roberts, R. E., Kaplan, G. A., Shema, S. J., & Strawbridge, W. J. (2000). Are the obese at greater risk for depression? *American Journal of Epidemiology, 152*, 163-170.

Rodin, J. (1981). Current status of the internal-external hypothesis for obesity. *American Psychologist*, *36,* 361-372.

Schachter, S. (1971). Some extraordinary facts about obese humans and rats. *American Psychologist, 26,* 129-144.

Schachter, S., Goldman, R., & Gordon, A. (1968). Effects of fear, food deprivation, and obesity on eating. *Journal of Personality and Social Psychology*, *10*, 91-97.

Scott, K. M., McGee, M. A., Wells, J. E., & Browne, M. A. O. (2008). Obesity and mental disorders in the adult general population. *Journal of Psychosomatic Research*, *64*, 97-105.

Stice, E. (1994). Review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review*, *14*, 633-661.

Stunkard, A. J., & Wadden, T. A. (1990). Restrained eating and human obesity. *Nutrition Reviews*, *48*, 78-86.

Van Strien, T., Frijters, J. E., Bergers, G., & Defares, P. B. (1986). The Dutch Eating Behavior Questionnaire (DEBQ) for assessment of restrained, emotional, and external eating behavior. *International Journal of Eating Disorders*, *5*, 295-315.

Waller, G., Meyer, C., & Ohanian, V. (2001). Psychometric properties of the long and short versions of the Young Schema Questionnaire: Core beliefs among bulimic and comparison women. *Cognitive Therapy and Research*, *25*, 137-147.

Waller, G., Ohanian, V., Meyer, C., & Osman, S. (2000). Cognitive content among bulimic women: The role of core beliefs. *International Journal of Eating Disorders*, *28*, 235-241.

Wilson, G. T. (1994). Behavioral treatment of obesity: Thirty years and counting. *Advances in Behaviour Research and Therapy*, *16*, 31-75.

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*, 361-370.