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The "ACT-ive" Pursuit of Loss and Gain: The Impact of an Acceptance and Commitment Therapy-based Intervention on Post Weight-Loss Surgery Individuals.

A thesis presented in partial fulfilment of the requirements for the degree Doctor of Clinical Psychology at Massey University, Auckland, New Zealand

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Abstract

Obesity prevalence continues to increase at an alarming rate worldwide and poses serious health risks to those affected including increased morbidity, mortality, and psychosocial consequences. Weight-loss surgery is currently the best evidence-based treatment for obesity yet, substantial postoperative weight regain is reported within 2-5 years. Successful weight management is complicated when longstanding psychological difficulties are present, that often require psychological input to address.

In response, a private weight-loss surgery clinic has developed an Acceptance and Commitment Therapy-based (ACT) Intervention entitled the Foundations of Healthy Living (FOHL) Retreat with the aim of improving weight-loss surgery outcomes by providing greater support to individuals in the post-operative period.

In this thesis, an exploration of the efficacy of the FOHL Retreat is conducted. A quasi-experiment pretest posttest non-equivalent control group design is utilised to investigate the impacts of the intervention on weight-related experiential avoidance, eating behaviour, and body mass index (BMI) over time. An additional supplementary exploration into participants' relationships with food, eating, and their bodies pre- and post-surgically is undertaken using open-text response format questions. Those who attended the Retreat were also asked to share their perspectives on how their participation in the intervention affected their psychological wellbeing.

The main findings of the study showed that the ACT-based intervention demonstrated significant effects on several of the variables of interest, in particular, disordered eating and BMI. These effects were mediated by improvements in weight-related experiential avoidance, suggesting the importance of focussing on targeting experiential avoidance as a key mechanism of change in positive postoperative psychological and weight outcomes.

The qualitative component of this study expanded on these findings, identifying several key themes present in the experiences of individuals both prior to, and following, weight-loss surgery. Additionally, qualitative responses provided further insight as to the psychological changes participants experienced.

Taken together, these findings highlight firstly, the importance of addressing the psychological needs of weight-loss surgery individuals, and secondly, the value of ACT in augmenting surgical outcomes. The results presented here also offer suggestions for further development and future dissemination of such interventions for this population.

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1. Introduction

1.1. Overview

Over the past decade, obesity has been recognised as one of the most urgent public health threats with global prevalence rates having more than doubled since 1980 (Finucane et al., 2011). In New Zealand, the incidence of obesity has tripled since 1977 with two-thirds of individuals aged 15 years and over being overweight or obese (Social Policy Evaluation and Research Unit [SUPERU], 2015). This positions New Zealand as the third most obese country in the Organisation for Economic Co-operation and Development (OECD, 2017) which warrants grave concern given obesity's negative impact on the nation's health, socio-economic and financial status. According to estimates from the Mckinsey Global Institute (2014), obesity's economic impact has reached US$2 trillion matching that of smoking and armed conflict (Dobbs et al., 2014). Obesity is a significant risk factor for several non-communicable diseases including Type 2 diabetes, coronary heart disease, hypertension, gout, and multiple cancers (SUPERU, 2015; WHO, 2021). It is a life threatening condition shortening life expectancy by up to 14 years (Kitahara et al., 2014), and one of the greatest health expenditures, consuming between 2 and 7% of the New Zealand national health care budget each year (Ministry of Health [MOH], 2009). The psychological consequences of obesity are also far reaching, with high levels of internalised weight-stigma, negative affect, low self-esteem and reduced quality of life (Chu et al., 2019; Bulik, 2002; Goldschmidt et al., 2010).

While genetics account for anywhere between 25 to 70% of the variance in body mass index (Labib, 2003), the recent rise in obesity rates have typically been attributed to the obesogenic environment (Brownell, 2002; French et al., 2001; Stroebe, 2008; Swinburn et al., 2011). Over recent decades, societies have seen a rise in energy-dense, low nutrient, highly accessible and inexpensive food options in combination with various other features of the modern environment that reduce physical activity and promote sedentary lifestyles. These features have undeniably precipitated the rise in obesity rates and further necessitated self-regulation with eating in order to prevent weight gain. In this regard, there is a need to comprehend the factors that underlie individual differences in eating behaviour in order to understand why some individuals are better able to self-regulate their intake in the presence of these environmental temptations.

Psychological theories have sought to identify the core mechanisms implicated in the development and maintenance of obesity, with the aim of understanding how it can be effectively addressed. Empirically validated models include theories of attachment, emotional regulation, cognitive/dietary restraint, and the transdiagnostic approach, all of which provide theoretical explanations of disordered eating patterns associated with obesity (Burton & Abbott, 2017). Nevertheless, interventions have remained primarily behavioural and symptom focused, emphasising increasing commitment to a healthy diet and regular physical activity. However, the efficacy of these behavioural interventions remains weak, as findings typically reflect only modest weight-loss of 5-10% and at best, delayed weight regain. Based on these results, it is reasonable to conclude that in pursuit of improved outcomes, interventions should also target the psychological constructs that underpin, and maintain dysfunctional eating (Haynos et al., 2016).

Contrarily, weight-loss surgery has recently emerged as the leading evidence-based treatment for obesity with substantial weight-loss reported throughout the medical literature (Chang et al., 2014). However, as surgery-induced weight-loss gradually stabilises, the extent of successful weight-management becomes increasingly dependent on individual behavioural adjustments. Given the large prevalence of pre-existing disordered eating present in the weight-loss surgery population (Bocchieri et al., 2002), making the necessary adjustments to eating behaviour can prove difficult and subsequently, substantial weight-regain is common

(Bulik et al., 2002; Rudolph & Hilbert, 2013). As such, psychological treatment in conjunction with surgery is indicated in order to remedy disordered eating behaviours and consequently improve long-term outcomes.

1.2. Aims

The primary aims of this thesis are to examine the efficacy of an Acceptance and Commitment (ACT; Hayes et al., 1999, 2016) based intervention for postoperative weight-loss surgery individuals. The intervention entitled the Foundations of Healthy Living Retreat was developed in 2015 by Weight Loss Surgery Limited, who made an initial request to the research team for investigating outcomes. In order to do so, an analysis of individual and group change trajectories will be made with regards to weight-related experiential avoidance, eating behaviours, and body mass index (BMI). Additionally, an exploration of subjective experiences of disordered eating and weight management will be made with a specific focus on the origins of individuals' problems in these areas and how their relationship with food and their body has changed since having weight-loss surgery. Of particular interest will be the identification of key factors that contribute to weight management issues prior to, and post-surgery. This may provide important information to allow further development of treatments to enhance surgical outcomes and benefit those who continue to struggle with weight control.

2. Obesity

2.1. Overview

This literature review begins with an overview of the definition, classification, and prevalence of obesity, focussing specifically on the New Zealand context. This is followed by an exploration of the etiology of the development and maintenance of behaviours that underlie obesity. While the role of genetic and environmental factors will be acknowledged, the main body of this section focuses on psychological theories of obesity and highlights the mechanisms that underpin obesity. Subsequently, an overview of interventions for obesity management will be explored, namely weight-loss surgery, behavioural therapy, and ACT. A review of studies that have evaluated the effectiveness of these interventions on weight-related and psychological outcomes associated with weight management will be included. Given the nature of this topic, the breadth of material that could be included in this literature review is substantial. However, for the purposes of this research, discussion will focus primarily on research conducted within the psychological literature.

2.2. The Obesity Epidemic

The world is currently facing an obesity epidemic. Over the past 50 years, the prevalence of obesity has risen markedly, initially beginning in the Western World but since becoming more widespread across developing countries (Ng et al., 2014). It is a major risk factor for a number of chronic and life threatening diseases such as Type 2 diabetes, heart disease, ischaemic stroke, kidney disease, fatty liver disease, and several cancers including breast, colon, endometrium, gallbladder, and kidney cancer (SUPERU, 2015). Individuals living with obesity also have an increased risk of additional health conditions including sleep apnoea, infertility, gout, and musculoskeletal problems (Ministry of Health, 2015).

2.2.1. Obesity Classification

The World Health Organization (2021) define obesity as an "abnormal or excessive fat accumulation that presents a risk to health" (Obesity section, para. 1) which is often diagnosed in clinical practice based on a BMI ≥ 30 kg/m^2. It has been recognised as a disease by the National Institutes of Health since 1998 and more recently by the American Medical Association (AMA) in 2013, with the support of the Obesity Society. Although a clear and scientifically accepted definition of 'disease' is lacking, the current definition developed by the AMA's Council on Science and Public Health identifies the following criteria: an impairment of the normal functioning of some aspect of the body; characteristic signs or symptoms; harm or morbidity (American Medical Association House of Delegates, 2013). However, there lies substantial controversy over the conceptualisation of obesity as a disease, making a concise definition problematic.

Counterarguments to the disease definition of obesity posit that this view increases dependency on health care systems by undermining the role of individual responsibility and self-monitoring of dietary behaviour (Tanner, 2013). Another opposing viewpoint argues that pathologising body fat by labelling it a disease perpetuates weight discrimination (Kyle et al., 2016; Müller & Geisler, 2017). Additionally, not all obese individuals experience adverse physical consequences yet are subject to the stigmatisation associated with being overweight (Bray et al., 2017).

Despite the aforementioned points, the disease definition of obesity was intended to reduce discrimination surrounding the dominant perception that obesity is simply reflective of overeating and poor self-control. It was assumed that the disease label may provide more benefits than harms through the provision of more resources for prevention and treatment (Müller & Geisler, 2017). Although the final decision to consume food or to exercise is of a personal nature, these decisions are influenced by a range of interrelated factors that are often beyond individual awareness. Furthermore, health research continues to indicate various genetic, metabolic, environmental, and psychological risk factors implicated in the development of obesity. Consequently, this knowledge base supports a complex, multifactorial etiological profile of obesity beyond poor lifestyle choices alone (Kyle et al., 2016).

Given that eligibility criteria for weight-loss surgery in New Zealand requires individuals to have a BMI over 40 or alternatively, a BMI of 35 with a severe obesity-related disease (Healthpoint Limited, 2021), the majority of candidates are likely to have experienced varying degrees of obesity-related physical and/or psychological impairment that ultimately influenced their decision to seek medical treatment (Ogden et al., 2006).

In sum, there is an absence of current evidence for the benefits of the disease label of obesity with the potential for it to perpetuate weight stigma and associated shame. Nevertheless, based on surgical eligibility criteria, it can be assumed that the weight-loss surgery population comprise a subset of obese individuals whose health has been adversely affected by obesity. Thus, the present research acknowledges obesity as a risk factor for disease including Type 2 diabetes mellitus, hypertension, stroke, and cardiovascular disease (SUPERU, 2015), disability, and death, as opposed to a disease itself.

2.2.2. Measurement of Obesity

BMI is currently the most widely used measure of obesity in the medical profession (Seidell & Halberstadt, 2015). BMI is calculated using the formula of weight divided by height squared. The globally agreed upon weight categories according to BMI are presented in Table 1. However, despite its acceptability, BMI is not without inherent limitations. First, due to its inability to distinguish between lean body mass and body fat (a correlate of disease risk) it is at risk of overestimating obesity among muscular individuals and underestimating obesity in the older adult population (WHO, 2000). Second, variations in the correlation between BMI and body fat are attributed to a range of factors including body proportion, age, and gender (Harvard T.H. Chan School of Public Health, 2021a). Third, the degree of risk indicated by a given BMI varies across different demographic groups, providing further reason why health should not be judged on the sole basis of BMI (Deurenberg et al., 2002). Thus, BMI should be interpreted with caution when used for cross-sectional comparisons.

Based on these limitations, additional methods of identifying whether individuals are at increased risk of obesity-related diseases have been established and include waist circumference as an approximate index of intra-abdominal fat mass and total fat (measured against sex specific cut-off points); and waist:hip ratio (WHR) (WHR > 1 in men and >0.85 in women). While both methods are close correlates of BMI, there are few reference standards for body fat percentage based on these methods while established risk categories are also lacking (Centers for Disease Control and Prevention [CDC], 2020). Thus, a majority of the research literature classifies obesity using BMI.

Notwithstanding its limitations, overall the research shows that as BMI increases, so too does the risk of negative health outcomes including hypertension, Type 2 Diabetes, and heart conditions (Harvard T.H. Chan School of Public Health, 2021b). Furthermore, the World Health Organisation (2018) maintain that BMI remains the most useful population-level measure of obesity and its associated risks while also remaining a popular outcome variable in the obesity literature. However, to prevent further pathologising larger bodies, it is important that BMI be interpreted along with other clinical markers to determine an individuals' health status. For the purposes of this research, BMI was selected as a relevant outcome measure of change in weight over time along with several other constructs, and was not interpreted as a measure of participants' overall health.

Table 1

Classification of Adults according to Body Mass Index (BMI) by the World Health Organisation (2000)[a]

Classification	BMI	Risk of comorbidities
Underweight	<18.50	Increased
Normal range	18.50-24.99	Average
Overweight	≥ 25	
Preobese	25.00-29.99	Increased
Obese Class I	30.00-34.99	Moderate
Obese Class II	35.00-39.99	Severe
Obese Class III	≥ 40.00	Very Severe

[a]These BMI values are age independent and the same for both sexes. However, BMI may not correspond to the same body fat percentage in different populations due, in part, to differences in body proportions. The table shows a simplistic relationship between BMI and the risk of comorbidity, which can be affected by a range of factors, including the nature of the diet, ethnic group and activity level. The risks associated with increasing BMI are continuous and graded and begin at a BMI above 25.

2.2.3. Obesity Prevalence

Globally, the prevalence of obesity has doubled since 1980 and the most recent global statistics estimate that 603.7 million adults are obese (The Global Burden of Disease [GBD] Obesity Collaborators, 2017). With obesity rates increasing by 0.5% each year, an estimated 1.3 million New Zealanders are currently obese (GBD Obesity Collaborators, 2017; Sharpe et al., 2015). New Zealand currently has the third highest obesity prevalence in the OECD with one in three adults aged 15 years and over obese, including 30% of males and 33% of females (Ministry of Health, 2019/20). Furthermore, the number of New Zealand adults in the ‘extreme’ obesity category (as indicated by a BMI of > 40) is estimated to be 201,000 which is a 70% increase since 2006/7 (Ministry of Health, 2019/20). Similarly, childhood obesity rates have also increased to 9.4%, that is, a 4% increase since 2006/7 (Ministry of Health, 2019/20). This warrants preventative action given the strong association between childhood obesity and various social, medical, and mental health issues (Ministry of Health, 2020. Large cohort studies have established obese children to be five times more likely to be obese in adulthood (Ministry of Health, 2019/20; Simmonds et al., 2016).

According to the most recent New Zealand statistics, obesity appeared to increase with age, peaking in the 55-64 age bracket (Ministry of Health, 2019/20). Prevalence also varies across ethnicity with significant increases in minority cultures. Rates are highest among Pacific adults who are 2.5 times as likely to be obese than non-Pacific adults, with 65% currently obese. Māori also have high obesity rates at nearly 48%, with adults 1.8 times as likely to be obese than non-Māori adults (Ministry of Health, 2019/20). This is particularly concerning given that high BMI is one of the top three risk factors contributing to ill health, disability and shortened life expectancy in New Zealand.

Interestingly, contradictory findings with regards to the association between wealth and obesity have been reported. Given that the problem of obesity was first identified in developed countries, economic wealth was hypothesised as a clear environmental precondition for obesity, and a positive relationship between GDP and BMI was observed (Egger et al., 2012; Masood & Reidpath, 2017). In contrast with these findings, among Western industrialised countries, obesity appears to be more prevalent among the lower socioeconomic groups, with these effects being most prominent in females (Stroebe, 2008). This is evident in the New Zealand context, with obesity rates nearly twice as high for adults living in deprived areas when compared to those living in the least deprived areas (Ministry of Health, 2020).

There are several plausible explanations for the higher prevalence of obesity among lower socioeconomic groups with these effects most pronounced in females. It is possible that gender differences reflect increased internalisation of societal pressure for females to be slim, which appears particularly pronounced among women of higher socio-economic status

(Carr & Friedman, 2005). In addition to possessing more negative beliefs about obesity, those of higher socioeconomic status were also more likely to endorse the thin ideal than those of low socioeconomic status (Carr & Firiedman, 2005). Furthermore, the relationship between socioeconomic status and obesity may be mediated by the low-cost and high accessibility of energy-dense foods, in addition to the higher costs of fruits, vegetables and low-fat protein (Ni Mhurchu & Ogra, 2007; Rao et al., 2013).

2.2.4. The Burden of Obesity

Obesity was recently identified as one of the largest social burdens in the world (Dobbs et al., 2014). The implications of obesity are extensive and multifaceted, affecting the wellbeing of nations, communities, and individuals. The main costs associated with obesity can be grouped into the following three interrelated categories: health, socioeconomic, and psychosocial.

Most notable in the research literature are the adverse health implications associated with obesity. It is one of the largest preventable causes of disease burden and is an established risk factor for premature mortality and multiple non-communicable diseases in the general population (Ezzati et al., 2004; Swinburn et al., 2011). Given the significance of obesity as a global health threat, it might be expected that methods of monitoring its health effects are relatively advanced. Yet remarkably, few countries possess adequate systems to monitor these effects and findings have been relatively limited to date. The GBD Obesity Collaborators (2015) analysed data from 68.5 million individuals to assess the trends in the burden of disease related to high BMI (Swinburn et al., 2011). Results indicated that high BMI contributed to 4 million deaths in 2015, 39% of which were persons with a BMI between 25 and 30. Coronary heart disease is the leading cause of death in New Zealand and estimated to be responsible for approximately 33% of deaths nationwide (Heart Foundation, 2021). This is of particular concern, given that 170,000 people currently live with heart disease in New Zealand (Heart Foundation, 2021). Although the worldwide mortality rates of cardiovascular disease have decreased over the past 40 years, accounting for approximately 18% of deaths in 2012, other non-communicable diseases of similar severity including diabetes and chronic kidney disease have since increased. Type 2 diabetes was identified as the second leading cause of death while kidney disease was the leading cause of BMI-related disability worldwide in 2015, respectively (The GBD Obesity Collaborators, 2015). Multiple forms of cancer have also been associated with obesity including cancer of the colon, endometrium, liver, breast, pancreas, and kidneys (Stroebe, 2008).

The most recent estimates of the New Zealand health care costs of obesity amounted to $624 million, approximately 4.4% of the $15.4 billion national health care expenditure in 2006 (Lal et al., 2012). Type 2 diabetes accounted for the highest obesity-related costs at $238.7 million followed by hypertension. It is recognised that these figures likely represent a gross underestimation of the true costs in 2006 as well as the current health-related expenditure for several reasons. Firstly, only the primary diagnosis was used in the cost analysis. Second, patient related costs of medical treatment compliance were excluded as were outpatient pharmaceutical costs. Finally, additional obesity-related diseases have since been discovered leading to an inevitable increase in health-care related costs. Nevertheless, these figures have greatly increased from an estimated $135 million in 1991, that is, 2.5% of total health care expenditure (Swinburn et al., 1997).

Though substantial, health care costs are only one aspect of the financial burden of obesity. Obesity is a well-known predictor of sick leave and individuals with extreme obesity are more likely to retire earlier thus reducing their contribution to national productivity (SUPERU, 2015). Loss of productivity costs related to absenteeism, disability, and impaired working ability are also significant. According to Lal and colleagues (2012), total productivity losses resulting from obesity-related absenteeism and disability in New Zealand varied between $98 million and $225 million (values varied according to analysis method).

2.2.5. Weight Stigma

Notably, the psychological impacts of obesity are also far reaching. Unflattering portrayals of obese persons pervade popular culture in attempt to incite weight-loss and improve health. A substantive literature has demonstrated that consensus views obesity as unattractive and undesirable which in turn, forms the underpinnings of fat phobia; this is a key vulnerability and maintenance factor of eating disorders. Obesity prevention initiatives typically rely on mobilising this fear to support their aim of promoting healthy eating (Pinhas et al., 2013).

Yet, despite their intention, preventative initiatives that condemn fatness may inadvertently increase the risk of disordered eating (Leme et al., 2020). Prevention programs typically include components that promote decreased caloric intake and increased exercise. This may encourage dieting behaviour which a well-known risk factor for disordered eating (Leme et al., 2020). Furthermore, there is little evidence to support the effectiveness of these programs in reducing weight status, as depicted in a recent systematic review (Leme et al., 2020). Leme and colleagues (2020) compared the impact of 20 obesity prevention programs that focused on reducing caloric intake and increasing exercise with 15 prevention programs that focused on reducing disordered eating behaviours to promote a positive relationship with food and eating. Both types of prevention programs failed to produce significant differences in weight status over time, while the majority of programs that targeted disordered eating behaviours demonstrated reduced body dissatisfaction, dieting, and weight control behaviours (Leme et al., 2020).

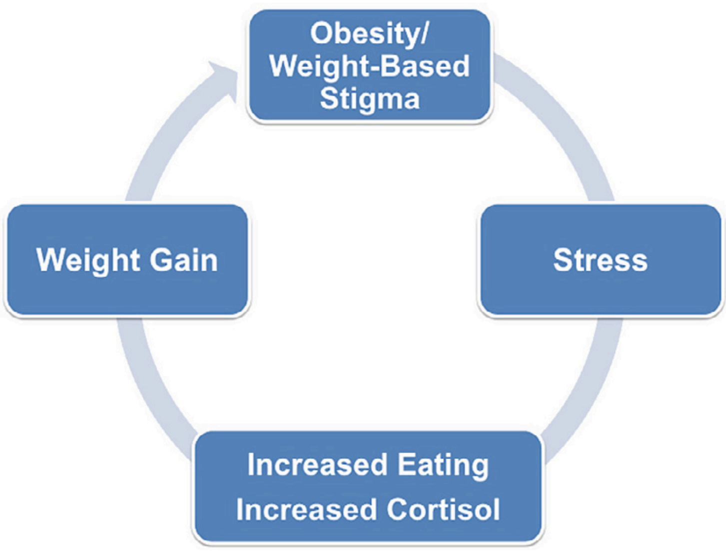
Weight-stigma is defined as the devaluation and social rejection of individuals who fall outside of the social normative weight range (Tomiyama, 2018), and continues to spread on a global scale. It refers to both direct forms of stigma such as verbal criticism as well as indirect forms such as the pervasive idealisation of thinness. Unsurprisingly, exposure to weight-stigma can negatively impact body satisfaction by increasing one's awareness of the discrepancy between their current self and ideal self (Blodorn et al., 2016).

Research to date has shown that a majority of individuals with obesity experience internalised weight-stigma (Bocchieri et al., 2002b; Ogden et al., 2006). This is defined by feelings of shame and self-devaluation in relation to one's excess weight, as a result of social stigma and discrimination (Bocchieri et al., 2002b). In a large sample of 2036 adolescent girls, those who were labelled by family, friends, and teachers as "too fat" at the age of 14 showed increased disordered eating cognitions including drive for thinness and body dissatisfaction, as well as disordered eating behaviours including bulimic tendencies 5 years later (Hunger & Tomiyama, 2018). These effects were independent of BMI, initial levels of disordered eating, ethnicity, parental education and income, and thus reflects the long term potency of weight-stigma.

Unsurprisingly, weight discrimination functions across multiple life domains including employment, health care, education, and interpersonal relationships (Puhl & Heuer, 2009). Tomiyama (2014) developed an original model to propose the implicative role of prejudice, discrimination, and stigma on psychological factors that serve to maintain obesity, as shown in Figure 1. The cyclic obesity/weight-based stigma (COBWEBS) model posits weight-stigma as a stressor central to weight regain based on two interrelated mechanisms: increased cortisol secretion, and eating behaviour. With regards to the first mechanism, elevated cortisol secretion arises following activation of the stress responsive hypothalamic-pituitary-adrenocortical (HPA) axis in response to either real, or imagined threat (Dickerson et al., 2004). This process can thus be triggered by social situations that have the potential to threaten an individual's social identity, such as those involving external negative appraisal from others (Major & O'Brien, 2005). Thus, as a result of common exposure to negative evaluation, cortisol secretion may be more elevated among obese individuals. Additionally, cortisol secretion has been associated with several obesity-related health conditions including hypertension and cardiovascular disease; problematic eating behaviour; and promoting fat storage (Tomiyama, 2014).

Figure 1

The Vicious Cycle of Weight Stigma.



Note. Reprinted from Tomiyama, A. J. (2014). Weight Stigma is Stressful. A Review of Evidence for the Cyclic Obesity/Weight-Based Stigma Model. *Appetite*, 82, p.9.

Shame is also a key emotional mechanism in the COBWEBS model (Tomiyama, 2014). Shame functions to promote self-preservation and thus protect individuals from potential threats such as weight stigma (Dickerson et al., 2004). It is a reliable predictor of cortisol secretion and positively associated with obesity as supported by correlational studies that found a positive relationship between perceptions of weight sigma and food intake among individuals with obesity (Conradt et al., 2007; Kemeny et al., 2004; Tomiyama, 2014). This association can be understood as follows; overweight individuals often internalise weight-related stigma which increases cortisol secretion and feelings of shame. Consequently, these changes increases one's risk of weight gain both directly, and indirectly by sensitising the food-reward system (Rudenga, Sinha, & Small, 2013).

In further support of Tomiyama's (2014) model, research has identified additional variables implicated in the relationship between weight-related stigma and obesity. In particular, stress eating induced by weight-stigma exposure has been found to impair self-regulation through decreasing self-efficacy. Major et al. (2014) assessed self-efficacy for dietary control and weight stigma concerns in an experiment evaluating the impact of weight-stigmatising messages on social identity. Ninety-three female participants were either assigned to read a news article about weight-stigma towards overweight individuals in the workplace, or a control article about smoking. Results found that participants exposed to weight stigma who perceived themselves as overweight, self-reported less dieting self-efficacy than controls. This could suggest that weight stigma may significantly compromise individuals' weight-loss efforts for those who perceive themselves to be overweight. Further, exposure to weight stigma caused only those women who perceived themselves as overweight to consume more calories than participants in the control condition. Based on their findings, the authors concluded that weight-stigmatising messages designed to tackle obesity can have paradoxical effects and ultimately, perpetuate, rather than prevent, obesity. However, results should be treated as tentative given the main effect of the manipulation on dieting self-efficacy was not significant.

Along with these findings, internalised stigma may also decrease self-esteem and increase the risk of significant mental health issues including depression, anxiety, body image dissatisfaction, and eating disorders (Abilés et al., 2010; Friedman et al., 2008; Puhl & Heuer, 2009). Karlachian et al. (2007) found a positive association between the severity of psychiatric disorders and BMI; individuals with higher levels of obesity displayed more severe cases of depression, lower self-esteem and quality of life relative to individuals with less severe cases of obesity.

Relatedly, negative psychological impacts associated with obesity were highlighted in a qualitative study that retrospectively investigated post weight-loss surgery individuals psychological experiences of their weight prior to, and following surgery (Ogden et al., 2006). Fifteen participants who underwent weight-loss surgery up to four years prior were interviewed about their personal weight histories. Results highlighted the large extent to which obesity had significantly compromised individuals' psychological health by decreasing self-confidence, self-esteem, and quality of life. Many disclosed feeling miserable and depressed as a result of their weight which had significant implications for their social functioning. Participants indicated high levels of internalised weight-stigma evidenced by thoughts that they had been negatively evaluated by others on the basis of being overweight (Ogden et al., 2006). These negative perceptions led to avoidant behaviours that increased social isolation such as avoiding events and interactions that could perpetuate body image concerns. However, avoidance has been shown to reinforce these weight-related concerns by preventing the opportunity to challenge over-evaluations of physical appearance and negative self-judgments (Rosen et al., 1991). Additionally, it is also likely to increase reliance on eating as a coping strategy, by limiting one's engagement in alternative activities.

Overall, several studies have substantiated the negative and paradoxical influences of weight-stigma towards obese individuals. Thus, interventions aimed at obesity prevention and management that both acknowledge and address the harms of internalised weight-stigma are warranted.

2.3. Theories of Obesity

2.3.1. Obesity, Genetics, and the Environment

There is substantial variation across disciplines regarding the theoretical explanations of obesity. Several factors have been identified including genetics, metabolic dysfunction, the modern environment, emotion regulation and transtheoretical models of eating behaviour. Fundamentally, the proximal cause of obesity is clear: greater energy input relative to energy expenditure. However, the mechanisms that underlie this are multifactorial and complex. Genetic predispositions to obesity have been well studied within the literature with the estimated heritability of body weight predicted to be anywhere between 25-70% based on studies of monozygotic and dizygotic twins (Bouchard et al., 2004; Elks et al., 2012; Labib, 2003; Min et al., 2013).

While no one obesity gene exists, gastrointestinal tract hormone defects have been identified as one possible mechanism via which a genetic risk factor could exert effects. In particular, obese individuals may have leptin deficiencies caused by a single gene defect. Leptin is a hormone responsible for maintaining body homeostasis by signalling satiety (Labib, 2003). Thus, a deficiency may impair one's ability to regulate energy requirements, increasing the likelihood of weight gain. On the contrary, obesity has been associated with high levels of circulating leptin which could be suggestive of a resistance as opposed to a deficiency (Labib, 2003). As the process of dieting often requires overriding physiological hunger cues with cognitive rules, it is possible that previous dieting attempts desensitise an individual to leptin signals while the type of diet is also thought to have an impact (Sainz et al., 2015). Furthermore, rat experiments suggest that leptin resistance can impair other physiological processes such as carbohydrate metabolism and nutrient intestinal absorption however, exactly how these processes impact food intake remains unclear (Stroebe, 2008; Yarandi et al., 2011). Though genetic research may prove useful for treating a subgroup of affected individuals, such investigation is unlikely to solve the global epidemic. As suggested by its rapid incline, several environmental and psychological influences related to obesity also require significant attention (Rössner, 2002)

There is widespread agreement across literature that environmental changes have facilitated overeating and the inhibition of physical activity, particularly in the developed world. Nevertheless, the multilevel and multifactorial composition of the environment makes a simple explanation somewhat impossible. Swinburn et al. (1999) first coined the term "obesogenic environment" which is defined as "the sum of influences that the surroundings, opportunities, or conditions of life have on promoting obesity in individuals and populations" (p. 564). This refers to the food rich environment that permeates across Western and many non-Western countries and is frequently recognised as a prominent contributing factor of obesity. Research has identified a causative relationship between energy-dense, inexpensive, and convenient food and obesity (Stroebe, 2008). Simultaneously, technological progression has seen a decrease in opportunities for physical activity through an increased use of computers and reliance on cars for transport (Schäfer Elinder & Jansson, 2008).

A comprehensive literature review was conducted in attempt to elucidate the role of consumer food environments and obesity by Holsten (2009). BMI and environmental variables were examined in relation to geographical arrangement and consumer conditions across seven studies. The majority of these studies found a positive association between the density of fast-food outlets as well as fruit and vegetable stores, the costs of fruits/vegetables, and BMI however, two studies failed to replicate these results. It is possible that the variability in the results of these studies may reflect methodological differences that comprise their comparability.

Although less pertinent in the literature, the influence of smoking as a contributor to obesity has also been explored. Smoking rates have gradually decreased over the past decade, dropping from 20% in 2006/7 to 14% in 2018/9 (Ministry of Health, 2021). Though findings have often been mixed, in a cross-sectional study, Dare et al. (2015) concluded that former heavy smokers, as defined by the consumption of over 20 cigarettes per day, were more likely to be obese than those who had never smoked and those who were current smokers. Both smoking and obesity were most common among socioeconomically deprived individuals (Dare et al., 2015). A dose-response relationship was also found where the difference in obesity risk between former smokers and never smokers was statistically significant for up to 30 years post-cessation (Dare et al., 2015). Such findings were further corroborated by Reas et al. (2009) and Basterra-Gortari et al. (2010) in a longitudinal study of BMI changes in smokers across an 11-year period. The mechanisms by which smoking cessation increases the risk of obesity are not fully understood, though nicotine has been recognised as an appetite suppressant and frequently serves as a stress-management strategy which could act as an alternative to emotional eating (Pisinger et al., 2017).

Based on the notion of the obesogenic environment alone, it would appear that the solution to obesity primarily lies within behavioural change including increasing physical activity and reducing energy consumption. However, the role of the environment on the development of obesity remains scientifically undefined and not all individuals exposed to the obesogenic environment are overweight. Beyond acknowledging the role of environmental factors in obesity, literature has failed to elucidate direct causal pathways. Thus, a stronger understanding of how the environment influences body weight is necessary as is the simultaneous investigation of psychological factors that may mediate this relationship.

2.3.2. Psychological Theories of Obesity

Psychological theories of obesity are well studied. Several perspectives span the obesity and eating disorder literature including attachment theory, transtheoretical models, self-regulation theory, and escape theory, and provide explanations for individual aspects of obesity. However, the interrelated nature of these theories has rarely been discussed and thus, a holistic account of obesity is lacking (Ball & Crawford, 2006). The following review has focused on the most prominent theories of obesity all of which posit disordered eating behaviour as a key mechanism implicated in its development and maintenance.

2.3.2.1. Attachment Theory. With regards to attachment theory, differences have been observed in the attachment styles of individuals with obesity compared to individuals of normal weight (Nancarrow et al., 2018). This theory states that infants base their conceptualisation of themselves, others, and the world on early caregiver to infant interactions (Bowlby, 1988). It is argued that secure attachments with caregivers facilitate the development of affect regulation skills in childhood (Fonagy et al., 2018). However, in instances where a caregiver inconsistently responds to their child's needs, or the child experiences early trauma such as abuse, an insecure attachment style may develop (Bowlby, 1988). One such style includes anxious attachment and is often characterised by concerns with rejection and abandonment in adulthood. As a result of insecure attachment, individuals may have deficits in their emotional regulation abilities and consequently rely on food to manage their emotions in the absence of adaptive coping strategies (Mikulincer et al., 2003; Nancarrow et al., 2018). To date, research has consistently identified associations between eating psychopathology and insecure attachment, indicating that those with eating disorders commonly experience higher levels of attachment insecurity than individuals without eating disturbances (Tasca & Balfour, 2014; Tasca et al., 2011; Ward et al., 2000). Multiple studies have examined early maladaptive schemas in people with diagnosed eating disorders. In particular, emotional deprivation, abandonment, enmeshment, and emotional inhibition were correlated with eating disorder behaviours, specifically binge eating and purging (Pugh, 2015; Unoka et al. , 2010). Further investigations of schemas found that emotional inhibition (defined by emotional suppression) was identified as a strong predictor of binge eating frequency in subjects with Bulimia Nervosa, Anorexia Nervosa – Binge Purge Subtype, and Binge Eating Disorder (BED) (Dudek et al., 2014). Similarly, Waller et al. (2003) found that the strength of core beliefs held by individuals with BED positively correlated with the frequency of binge eating episodes. These findings suggest that for some individuals, binge eating may be an avoidant coping mechanism for experiences of negative affect.

Research involving retrospective self-report accounts of attachment further supports the role of attachment in the onset and maintenance of obesity. Wilkinson et al. (2010) reported a significant association between attachment anxiety and higher than average BMI in a community sample that included obese students. This association was mediated by a pattern of disinhibited eating (failure to restrict food intake and overeat). Studies of bariatric surgery candidates and of those who have recently undergone weight-loss surgery have indicated a positive relationship between insecure maternal attachment and being overweight in childhood. In particular, anxious attachment positively related to eating pathology and BMI (Aarts et al., 2013; Aarts et al., 2015; Taube-Schiff et al., 2015).

Similarly, parental attachment has also been associated with lower levels of emotional awareness in obese patients (Rommel et al., 2012). Parental overprotection characterised by maternal denial of psychological autonomy and low paternal encouragement of behavioural freedom predicted less emotional awareness among a sample of 94 women with obesity (Rommel et al., 2012). Low levels of emotional awareness have previously been positively, and significantly associated with high levels of emotional eating in several overweight samples (Ouwens et al., 2009; van Strien et al., 2005; van Strien & Ouwens, 2006).

It is possible that low awareness of their emotions may prevent individuals from employing strategies to effectively address and resolve their distress, thus increasing the likelihood of emotional eating. Yet, Rommel et al.'s (2012) study established the opposite effect, showing emotional awareness to positively and significantly predict emotional eating. The authors speculated that these contrasting results may be attributed to methodological differences between their study and previous studies. Specifically, this study utilised a performance-based measure of emotional awareness while previous studies have typically relied on self-reports (Rommel et al., 2012).

Nancarrow and colleagues (2018) recently explored the role of attachment styles in obesity by comparing the attachment styles of individuals awaiting bariatric surgery (BMI > 40) (n = 195) to a sex, age, and height matched control group of individuals with a BMI between 18 – 30 (n = 195). The study also aimed to determine whether the role of attachment styles predicted BMI change for individuals 1 year post-surgery. Findings highlighted differences in the attachment styles of bariatric surgery participants and controls. Bariatric surgery individuals reported higher anxious attachment and lower avoidant attachment which may provide evidence for the role of food as a means of emotional regulation for individuals with obesity (Nancarrow et al., 2018).

This finding supports those of Taube-Schiff et al.'s (2015) cross-sectional study of 1393 bariatric surgery candidates where an association between attachment anxiety and higher levels of emotional eating was observed, mediated by deficits in emotional regulation (Taube-Schiff et al., 2015). Regarding post-surgical weight-loss in Nancarrow et al.'s (2018) study, substantial changes were observed across the bariatric surgery group however, these were unrelated to attachment styles. This supports prior studies that have similarly found no impact of attachment on weight-loss (Hambly & Ogden, 2017; Kiesewetter et al., 2010). In contrast, others have found anxious attachment to indirectly effect post-bariatric surgery weight-loss through poor dietary adherence (Aarts et al., 2015).

2.3.2.2. Emotional Theories of Obesity. One of the earliest modern theories of obesity was established by Kaplan and Kaplan (1957) and known as psychosomatic theory.

This theory posited that eating functions as a coping response to negative emotions. According to psychosomatic theory, appraisal of food intake as an effective form of self-soothing can lead to overconsumption and consequently obesity. Overeating is therefore considered a learned response that is utilised to reduce emotional discomfort, otherwise known as experiential avoidance.

However, experimental studies that evaluated eating behaviour following manipulations of anxiety among obese individuals failed to provide empirical support for Kaplan and Kaplan's (1957) psychosomatic theory (Hibscher & Herman, 1977; McKenna, 1972; Ruderman & Christensen, 1983; Slochower, 1983; Spencer & Fremouw, 1979). Furthermore, this theory claimed that only the obese are expected to appraise eating as an effective coping strategy for negative emotional states, despite evidence demonstrating that emotional eating is present in underweight, normal weight, and overweight populations (Geliebter & Aversa, 2003). Nevertheless, it can be argued that psychosomatic theory first introduced the role of emotions in eating; an association that has remained relevant in the development of subsequent theories of obesity.

As an extension to Kaplan and Kaplan's psychosomatic theory, Lacey (1986) further examined the coping function of problematic eating behaviours in relation to negative affect. This led to the development of emotional regulation theory which posited overeating as a coping strategy for the management of stressful life events. In accordance with attachment theory, Lacey (1986) argued that several factors including adverse family circumstances, over-reliance on external standards of self-worth, and a family history of eating issues predispose individuals to adaptive coping deficits. Together with a lack of coping strategies, these factors increase the likelihood of individuals adopting maladaptive yet easily accessible coping methods such as overeating in attempt to reduce uncomfortable emotional experiences, or distract from their presence (Lacey, 1986). Support for this theory has been found in studies demonstrating deficits in emotional regulation skills among individuals with diagnosed eating disorders relative to healthy controls (Lavendar et al., 2015).

Emotional regulation theory has been substantiated across a vast amount of experimental research. Studies have repeatedly shown the impact of emotions on eating behaviour to be much stronger for obese individuals than individuals in the 'normal' weight range (Gelibter & Aversa, 2003; McKenna, 1972; Rommel et al., 2012). Two independent experimental studies found that generating negative mood in women who met Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994) research criteria for Binge Eating Disorder (BED) triggered a binge-eating episode which was followed by self-reported reduced negative affect (Agras & Telch, 1998; Telch & Agras, 1996). Similarly, Leehr et al. (2015) systematically reviewed 18 studies of emotional regulation theory in the context of BED. Across all studies, negative affect was consistently identified as a precursor to binge eating which in turn, produced short term improvements in affect.

Naturalistic studies also support this theory, specifically those that investigate binge eating from a functional analytical perspective. One such study examined negative affect as an antecedent to binge eating episodes among 33 women presenting with bulimic symptoms as defined by the Diagnostic and Statistical Manual of Psychiatric Disorders (DSM-IV; American Psychological Association [APA], 1994) (Engelberg et al., 2007). Participants were asked to provide self-reports of eating behaviours after every eating episode as well as when prompted by a computer device which occurred three times a day, for a duration of two weeks. To avoid ambiguity and promote consistency across self-reports, participants were provided with definitions of types of eating episodes including binge eating as in the DSM-IV (APA, 1994) and a snack. Results substantiated emotional regulation theory in that eating episodes were more likely to be binges when preceded by low mood (Engelberg et al., 2007).

However, mood reports may have been retrospectively recorded following a binge and thus, the binge eating episode may have increased the likelihood that individuals rated their mood poorly.

In further support of emotional regulation theory, Munsch and colleagues used ecological momentary assessment (EMA) in a sample of overweight and obese individuals with BED over a week long period (Munsch et al., 2012). Low mood prior to, and at the first binge episode was rated significantly higher on days where binge eating occurred compared to non-binge days and these ratings peaked immediately before binge eating. This was followed by a slight decrease in subjective ratings of negative emotional states while positive affect increased temporarily (during a 4-hour observation period following a binge episode), reflecting the soothing function of overeating for these individuals (Munsch et al., 2012).

However, some studies have failed to support the positive function of overeating in reducing negative emotional states (Burton & Abbott, 2017). For example, a meta-analysis evaluating studies using EMA methods of assessment failed to replicate Munsch et al.'s (2012) results regarding reductions in negative mood post-binge eating, but did report high levels prior to binges (Haedt-Matt & Keel, 2011). This could be attributed to the times of mood measurement as none of the included studies examined mood during binge-eating where it is possible that food consumption may have temporarily regulated emotion. In further contrast with emotional regulation theory, clinical observations conducted by McManus and Waller (1995) highlighted that post-binge, individuals self-reported high levels of negative emotions including guilt and disgust as well as fear about weight-gain. However, upon further exploration, subjective reports have reflected that binge eating has reduced negative affect for a brief period of time in which the individual is actively bingeing, but later induces further distress (Chandarana & Malla, 1989; Root & Fallon, 1989).

Thus, despite a multitude of research on emotional regulation theory, the mechanisms by which overeating decreases negative affect remain unclear. To date, two hypotheses have been suggested. The first proposed by escape theory suggests that the act of eating serves as a temporary distraction from negative affect. Similarly, the second pertains to the finding that biological factors influencing the effects of carbohydrates and protein on neurotransmitter functioning are supposedly incompatible with the experience of intense emotions (Burton & Abbot, 2017).

2.3.2.3. Dietary Restraint Theory. In addition to emotion, dieting has also been recognised as a key determinant of eating behaviour that is predictive of obesity. Restraint theory was first proposed by Herman and Mack (1975) and posits that cognitive efforts to control food intake (eating restraint) paradoxically induce and maintain overeating. During the time in which this theory was developed, possible reasons for eating restraint were proposed as body dissatisfaction, media stereotypes, and the need for control.

However, more recent research suggests dietary restraint may be an expression of a particular psychological profile characterised by global cognitive rigidity (Roberts et al., 2007). Originally found in treatment resistant patients with Anorexia Nervosa, cognitive rigidity has received increasing interest in the overweight and obese population. It has been suggested that impaired set shifting, characterised by an inefficient mental ability to switch tasks or adapt one's behaviour as rules change, may assist in understanding compulsive eating disordered behaviours including overeating and restricting. In fact, evidence suggests that this cognitive profile may be more prevalent in obese populations compared to both healthy comparison groups and individuals with eating disorder diagnoses (Aloi et al., 2015; Carnell et al., 2012; Kober & Boswell, 2018; Roberts et al., 2007; Wu et al., 2014). Across a clinical sample of 113 participants comprised of individuals with obesity, Anorexia Nervosa, Bulimia Nervosa, and Eating Disorder Not Otherwise Specified, obese individuals performed most poorly on an objective task assessing cognitive flexibility (Perpiñá et al., 2017).

This finding was further supported by Aloi and colleagues (2015), who found larger cognitive flexibility deficits among individuals with obesity with and without binge eating disorder (BED), compared to those with Anorexia Nervosa. The authors concluded that the absence of an obese non-eating disordered control group prevented a more detailed cognitive profile assessment across obese BED and non-BED participants. Nevertheless, both studies support the salience of general cognitive rigidity in the obese population which may help to explain why many of individuals with obesity adopt a rigid dietary approach to weight management that may further contribute to their difficulty in regulating food intake.

Despite its well-documented association to overeating, restrained eating has proven successful at times with studies demonstrating that individuals who self-identified as restraining their food intake on a regular basis have consumed less than their unrestrained counterparts (Thompson et al., 1988). Thompson et al.'s (1988) experimental study found that that restrained eaters both in a preload and control condition, consumed less food during a taste testing session when compared to unrestrained eaters. Other naturalistic studies have involved food diaries which demonstrated restrained eaters consumed significantly less calories over a 4-day period (Laessle et al., 1989). However, the small time-frame in which participants' food intake was monitored may influence these results as restraint becomes increasingly more difficult over time. Furthermore, food intake is frequently underreported in self-reports especially when eating less is valued.

While these findings support the efficacy of cognitive restraint in reducing eating behaviour, a majority of research has demonstrated opposing effects. For example, Ruderman and Wilson (1979) used a taste test procedure with a preload condition and found that restrained eaters, as measured by the Restraint Scale (Polivy et al., 1978), ate significantly more than unrestrained eaters irrespective of the condition they were assigned to. In Herman and Mack's (1975) original test of restraint theory (involving the administration of high calorie or low calorie preloads in taste test situations) they found that unrestrained eaters compensated by eating less in the high calorie preload condition whereas, restrained eaters in this condition did the opposite. However, findings should be interpreted with caution given that subsequent evaluation of the Restraint Scale's psychometric properties suggested that the scale met reasonable psychometric standards in a sample of normal weight individuals, while the scale's meaning was less clear in an obese sample and therefore, its reliability was less acceptable (Ruderman, 1983).

Nevertheless, these studies suggest two key considerations: firstly, the aforementioned evidence of successful outcomes from dietary restraint cast doubt as to whether restraint itself is inherently unsuccessful. Secondly, Herman and Mack's (1975) finding that those who preloaded with food consumed more food than those who did not preload, highlights the significance of disinhibition as a mechanism involved in overeating among restrained eaters.

Disinhibition is defined by eating more as a result of loosening restraints in response to emotional distress, intoxication, or preloading, and appears to be a common consequence of dietary restraint efforts (Stroebe, 2008). It is possible that the reason for this stems from cognitive and physiological processes. In order to sustain the body's homeostasis, that is, the weight range within which the body is designed to function optimally, biological processes operate to maintain food intake within a certain range (Herman & Polivy, 1984). This range is referred to as the "zone of biological indifference" and is above a minimal level of hunger and below maximum satiety (Stroebe, 2008). However, restrained eaters set their diet boundary with the maximum generally at the lower end of the zone in order to meet their weight goals (Herman & Polivy, 1984). In pursuit of weight loss, individuals typically adopt a rigid "all or nothing" approach to dieting characterised by psychological inflexibility in an attempt to avoid deviation from their self-imposed dietary guidelines (Burton & Abbott, 2017). This often leads to the labelling of 'forbidden foods' that are off-limits and requires the individual to employ intense cognitive self-regulatory efforts to override physiological hunger cues (Westenhoefer et al., 2013).

However, weight-loss activates physiological changes that induce food cravings to resist further deficit. Exerting cognitive control to override these signals becomes more difficult as they strengthen with increased weight-loss which in turn, increases the risk of overeating (Stroebe, 2008).

Evidently, overriding physiological signals proves an effortful task that is possible when attentional resources are unimpaired; however, this becomes increasingly difficult in the face of other stressors which compete for the same cognitive resources. The cognitive rigidity that is required in order to achieve diet-related goals can therefore gradually increase the risk of overeating. This often involves individuals denying themselves certain 'forbidden' foods which paradoxically increases their appeal and enhances preoccupation with these foods (Stroebe, 2008).

Eating disorder models posit that this creates an internal conflict characterised by the drive to adhere to personally-established diet rules which is threatened by a competing desire to consume that which they have deprived themselves of (Burton & Abbott, 2017; Fairburn et al., 2003). Eventual diet deviation is virtually unavoidable and regardless of the degree of transgression, typically induces heightened emotional states (anxiety, shame, guilt, disgust) which are perceived as intolerable. These emotions combined with a perceived sense of failure and cognitive rigidity, precipitates the abandonment of all dietary concerns and the onset of overeating (Burton & Abbott, 2017).

On the contrary, alternative accounts of overeating have positioned disinhibition as a precipitant of overeating and restraint as the consequence. This is supported by studies showing that not all individuals who overeat self-identify as restrained eaters (Stroebe, 2008). Subjective reports have indicated that bingeing is frequently proceeded by feelings of guilt and an intense fear of weight gain. As a result, restrictive behaviours are employed in an attempt to absolve negative emotions and restore a sense of control (Burton & Abbott, 2017). From this perspective, restraint is considered a requirement in response to excess consumption for those who seek to control their weight. Interestingly, a substantial portion of weight-loss surgery candidates attribute the onset of their overeating to significant histories of dieting behaviours triggered by early preoccupation with weight (Gibbons et al., 2006; Ogden et al., 2006). Therefore, irrespective of the order of their onset, it is theorised that both restriction and disinhibition for affect regulation may maintain a cycle of disordered eating associated with obesity.

Lastly, dietary restraint can also increase the risk of overeating through its negative impact on mood. Reduced food intake (particularly within an all or nothing cognitive framework) can induce negative mood for several reasons. First, dieting can initially reduce pleasure associated with previously-enjoyed foods and increase negative feelings towards these foods, such as guilt. Secondly, physiological changes associated with caloric deprivation increase fatigue and low mood. Third, the self-perceived failures induced by previous dietary deviations heighten negative affect. Together, all of these processes serve to increase negative emotional experiences which (as highlighted by emotional regulation theory) are predictive of overeating.

2.3.2.4. Transdiagnostic Cognitive Theory of Disordered Eating. The transdiagnostic approach is arguably the most well-established theory of eating disorders to date. It extends upon dietary restraint theory by providing core derivatives of dieting behaviour. Eating pathology is conceptualised from a cognitive framework and is based on the notion that all forms of disordered eating share similar characteristics referred to as core psychopathology (Fairburn et al., 2003). This psychopathology centres primarily on the over-valuation of body appearance and weight believed to result from early life experiences. Other interrelated characteristics that serve to predispose and perpetuate this psychopathology include core low self-esteem, fear of fatness strengthened by being overweight in childhood, internalisation of the thin ideal, and a disposition towards obsessional thinking or perfectionism (Fairburn et al., 2003; Williamson et al., 2004).

Among individuals who over-value weight and shape, self-esteem is often contingent upon their weight or size, and the ability to control these (Dudek et al., 2014). Low self-esteem may intensify appearance-related concerns in an effort to establish an adequate sense of self. These efforts are further reinforced by environmental stimuli and the internalisation of social beauty standards that overvalue thinness and stigmatise excess weight (Carr & Friedman, 2005). Such standards are particularly pronounced among females with beauty and femininity closely interlinked (Wilson & Fairburn, 1993).

As female self-worth and identity are more closely related to the ability to connect with others and receive social approval, women are at greater risk of internalising these social standards. If social approval is lacking, aversive emotional states characterised by self-blame may ensue, and this in turn, may serve to reinforce low self-esteem (Wilson & Fairburn, 1993). Consequent to the relationship between self-esteem and weight or shape, many individuals are compelled to engage in weight control efforts that can increase one’s risk of developing eating disordered behaviours (Dudek et al., 2014).

These processes may be of particular relevance for individuals with obesity, as exposure to weight-stigma is typically internalised, increasing the likelihood of over-evaluations of weight and shape and strengthening one’s drive for thinness (Ogden et al., 2006; Stice et al., 2002). Furthermore, both higher body mass and weight/shape over-evaluations are associated with increases in body dissatisfaction; this predicts disordered eating both directly and indirectly through its positive association with negative affect. In addition, obese individuals often report low levels of self-esteem and display higher levels of negative internal experiences including weight self-stigma and thus, the amalgamation of these factors likely increase their vulnerability to eating disturbances (Field et al., 2001).

According to the transdiagnostic approach, coping behaviours are often characterised by extremity and rigidity including dieting regimes, compulsive exercise, and avoidance of body or food stimuli. As explained in dietary restraint theory, deviating from these behaviours is forbidden given their potential costs to self-esteem yet, simultaneously are unavoidable (Fairburn et al., 2003). Additionally, their ability to effectively reduce negative emotions serves to further normalise these behaviours as necessary and reasonable methods of responding to uncomfortable internal experiences such as body dissatisfaction, anxiety, guilt, and depression (Williamson et al., 2004).

While support for the transdiagnostic theory is evident in studies of individuals with Anorexia Nervosa and Bulimia Nervosa, it is far less pronounced in research of overeating. However, Byrne and McLean (2002) identified drive for thinness as one of the strongest predictors of binge eating while the over-evaluation of body weight and shape is also prevalent among binge eaters across a range of studies (Dunkley & Grilo, 2007; Grilo et al., 2008; Grilo et al., 2013; Hrabosky et al., 2007).

Additional to the "core psychopathology" outlined by Fairburn and colleagues (2003), mood intolerance was also identified as another mechanism of disordered eating. Mood intolerance refers to an inability to manage mood states which leads to "dysfunctional mood regulatory behaviours" (Fairburn et al., 2003, p. 517). This dysfunction was believed to originate from early trauma experiences as similarly outlined by attachment theory. Though similar to emotional regulation theory in its recognition of the role of emotion in inducing disordered eating, Fairburn and colleagues (2003) proposed mood intolerance to include all strong mood states both positive and negative. Individuals may doubt their ability to cope with the strength of their emotional experiences leading to the employment of dysfunctional coping strategies such as binge eating.

Further to the cognitive mechanisms proposed by Fairburn et al.'s (2003) transdiagnostic theory, specific cognitive biases have also been found in individuals with obesity. In addition to general cognitive rigidity described earlier in this chapter, studies have also highlighted decision making deficits in this population. Across 12 studies, obese participants performed consistently worse than healthy weight individuals on the Iowa Gambling Task (IGT); a widely-used psychological task that simulates real-world decision making (Yang et al., 2018). Authors concluded that poor performance on the IGT suggests prioritisation of immediate reward even in the presence of high cost and the absence of long term benefit.

These results suggest elevated levels of impulsivity in obese individuals which may underpin extreme eating patterns such as overeating. Additionally, several studies reported obese subjects' IGT task performance failed to improve during the task, irrespective of BMI, age, education, severity of eating symptomatology (Brogan et al., 2011; Fagundo et al., 2012; Perpiñá et al., 2017). Instead, subjects continued to make decisions that increased immediate gain, despite being exposed to the future losses associated with this choice. From a clinical perspective, these findings may relate to self-regulation difficulties with food, despite an awareness of the negative consequences of overconsumption.

Weak central coherence has also been implicated in the maintenance of disordered eating and obesity. Central coherence is the ability to consolidate details into a larger, more holistic picture (Roberts et al., 2007). It is commonly assessed using the Rey-Osterrieth

Complex Figure Test (Osterrieth, 1944), where participants must copy and recall a complex geometric figure. Results across studies consistently showed that subjects with obesity displayed low scores on both the image recall and accuracy conditions, which may indicate attentional deficits as opposed to poor central coherence (Aloi et al., 2015; Perpiñá et al., 2017; Roberts et al., 2007). Furthermore, upon observation, Roberts et al. (2007) found individuals with overweight and obesity displayed a more impulsive, careless drawing style in the copy condition of the RCFT despite instructions directing subjects to copy as "carefully" as possible.

Taken together, these results may suggest that impulsivity and impaired self-regulation in individuals with obesity may be expressed through dysfunctional eating behaviours. Additionally, attentional deficits and an impaired ability to attend to the "bigger picture" may partly explain why some obese individuals experience difficulty maintaining weight-loss post-operatively, even in the presence of long-term health-related goals. Nevertheless, it is important to note that these findings are correlational and do not provide strong evidence that these differences are causes of obesity.

Beyond executive functioning differences, several general cognitive biases have also been implicated in the maintenance of eating disorders related to obesity (Williamson et al., 2004). Firstly, attentional bias pertains to the notion that individuals with disordered eating will have an increased focus on weight and food-related stimuli. Although a majority of studies have examined this in cases of Bulimia and Anorexia, studies of individuals with obesity have also demonstrated an attentional bias towards food cue images (Castellanos et al., 2009; Yokum et al., 2011) while dietary restraint has been shown to perpetuate this bias (Stroebe, 2008).

Another bias typically found in individuals with eating disorders and high body image dissatisfaction is selective interpretation bias (Williamson et al., 2004). This refers to the bias interpretation of incoming ambiguous information consistent with self-beliefs about one's body. Testing this bias has involved body size estimation tasks, which have shown individuals with eating disorders to overestimate their size consistent with their self-critical beliefs (Williamson, 1996). In some cases, research has found individuals with higher BMI, specifically those in the overweight and obese weight categories, overestimated their body size (Thaler et al., 2018). Additionally, studies have shown overeaters demonstrate a bias towards the most unattractive body parts when looking at one's own body (Svaldi et al., 2010; Svaldi et al., 2012a). While research in cognitive biases for individuals who overeat is still in its infancy, it is theorised that the overconcern with weight and shape that overeaters often experience may increase the risk of body size overestimation (Lewer et al., 2017),

Cooper et al. (1998) also found that individuals with disordered eating were more likely to attribute negative outcomes pertaining to the self to weight and shape related reasons; this was not the case when outcomes were positive or when they involved others. Ogden et al.'s (2006) qualitative study further exemplifies selective interpretation bias among individuals with obesity who recently underwent bariatric surgery. One individual recalled interpreting all social interactions with others to confirm their negative, self-directed, weight-related thoughts even in the absence of objective information that would reasonably support these (Ogden et al., 2006).

Memory bias may also perpetuate disordered eating as information pertaining to negative, weight-related self-evaluation may be more easily accessed in comparison to other information. This is supported by clinical observations of individuals with eating disorders who display a selective memory for information that supports their evaluation of their physical appearance (Vitousek & Hollon, 1990).

Evidently, multiple interrelated theories have proposed causal and maintenance mechanisms of eating pathology that have been supported by various observational studies

(Burton & Abbott, 2019; Engelberg et al., 2007; Fairburn et al., 2003; Munsch et al., 2012). Several risk factors have been highlighted, namely, insecure attachment, experiential avoidance induced by mood intolerance, cognitive inflexibility, dietary restraint, low self-esteem, and the over-evaluation of weight and shape. The following summary attempts to elucidate their associations in the context of overeating in obesity.

With regards to developmental risk factors of overeating, traumatic experiences in early childhood (including insecure attachment) can trigger the development of negative self-beliefs and dysfunctional coping strategies. These beliefs may include negative thoughts about self-worth, and lead these individuals to seek external forms of validation. In a society that emphasises the importance of body weight, self-worth may become easily intertwined with societal ideals of attractiveness that predominantly value thinness. However, the unattainable nature of thinness is likely to heighten obese individuals' sensitivity to excess weight stigma and increase body dissatisfaction which in turn, lowers self-esteem and mood (Thompson & Stice, 2001). Congruent with the mood intolerance hypothesis proposed by Fairburn and colleagues (2003), it is possible that these individuals perceive themselves as incapable of managing their adverse emotions and consequently engage in experiential avoidance, that is, efforts to avoid or escape the emotional discomfort. Thus, as eating is an accessible emotional experience, these individuals may consume food in an attempt to reduce their negative mood state which both positively and negatively reinforces their core beliefs. If adverse mood is reduced, overeating is positively reinforced as a necessary and reasonable method of emotional regulation. However, overeating is commonly followed by thoughts that strengthen negative self-evaluations such as, "I have no self-control" and "I'm a failure" and thus ultimately worsens mood.

Neurocognitive biases, negative core beliefs about oneself, coping resource deficits, an overvaluation of shape and weight, internalisation of the thin ideal, and social and environmental cues can all increase one's susceptibility to dieting, a behaviour many obese individuals exercise for weight management. However, the cognitive resources that other daily activities and emotional regulation demands limits the ability to sustain adherence to dietary rules and subsequently increases the risk of violating these results. Such violations subsequently reactivate negative core beliefs that in turn, increase the likelihood of future diet deviations through two pathways. The first involves the strengthening of negative affect consequent to a diet violation and the second involves the prioritisation of dietary restraint in order to compensate for dietary digressions. This paradoxically increases future digressions through psychological and physiological effects of eating restraint. It is this feedback loop that serves to maintain problematic eating behaviours and therefore warrants further focus and investigation, in order to develop interventions that effectively target the eating pathology that underpins obesity.

3. Interventions for Obesity

3.1. Interventions

Based on its global burden, reversing obesity trends necessitates intervention at the individual, societal, and governmental level. The chapter begins with a review of surgical interventions relevant to the study. In line with the focus of this research on the psychological components of obesity, this is followed by a review of literature pertaining to the efficacy of behavioural and psychological interventions for individuals with obesity and associated eating disturbances. Particular emphasis is given to Acceptance and Commitment Therapy (ACT) in the context of the weight-loss surgery population, to orient the reader to the context from which the Foundations of Healthy Living Retreat (FOHL) originated. A review of pharmaceutical treatments extends beyond the scope of the present research and is therefore not included. The chapter concludes with an overview of the research rationale, aims, and hypotheses.

3.1.1. Weight-loss Surgery

Presently, weight-loss surgery, otherwise known as bariatric surgery, has been appraised as the leading evidence-based treatment for obesity. To date, no other behavioural or pharmaceutical treatment has led to such rapid and marked weight loss (Chang et al., 2014; Sarwer et al., 2004). Specifically, gastric bypass has been identified as the “gold-standard” of weight-loss surgery producing a percentage excess weight loss (%EWL) of 64 - 80% (Chang et al., 2014). Comparatively, behavioural interventions produce an estimated 8-10% initial body weight loss; this may result in some improvement in weight-related health but is unlikely to result in optimal health gains among those with extreme obesity. Consequently, bariatric surgery has surged in popularity with an estimated 889 surgeries distributed evenly across the private and public sector in New Zealand from 2013 to 2014 (Kelly & Flint, 2015).

Interestingly, although women represent a little over half of the obese population, they represented 63% to 100% of obesity surgery patients across 47 outcomes studies (Bocchieri et al., 2002a). There are multiple interrelated factors that may partly explain this disparity, including the high levels of weight-related stigma females receive relative to males. As previously discussed, the impacts of weight-stigma are widespread and affect several life domains including education, relationships, and socioeconomic status (Enzi, 1994; SUPERU, 2015). Of particular significance is the impact of weight-stigma on mental wellbeing, as weight has a more substantial impact on self-esteem and sexual life for all females, including women at relatively low BMIs (Major et al., 2014). This is perhaps unsurprising given that females are also stigmatised at lower weights than males, and are more likely to internalise this stigma (Azarbad & Gonder-Frederik, 2010; Major et al., 2014). In contrast, men remained relatively unaffected in these areas with only those in the highest BMI group (BMI > 39.8) negatively affected to the same degree as women with regards to self-esteem and sexual life. Thus, it is reasonable to conclude that the higher levels of functioning impairments experienced by females may increase their drive to engage in extreme, yet effective weight-loss interventions such as surgery.

In New Zealand, weight-loss surgery generally requires a BMI of 35 with comorbidities or, a BMI of 40 and above (Ministry of Health, 2015). Additionally, evidence of failed attempts at weight-loss by non-surgical means is often expected for eligibility. Currently, the main surgical procedures for weight-loss are a combination of metabolic and restrictive techniques including gastric bypass and sleeve gastrectomy as well as a purely restrictive technique known as gastric banding. Individuals' chosen technique is dependent upon their individual needs and risk factors.

Gastric bypass surgery is often performed laparoscopically and involves making a small pouch from a part of the top of the stomach which is then joined to a piece of small bowel bypassing the rest of the stomach. Consequently, the size of the stomach is significantly reduced which has multiple advantages for the individual. These include substantial weight loss in the first 6 months and immediate improvements in Type 2 diabetes with remission rates varying from 86-92% (Chang et al., 2014). The sleeve gastrectomy is a more recently established weight loss procedure that involves laparoscopic removal of two thirds of the stomach that is replaced with a narrow tube (Victorzon & Salminen, 2015).

The reduction of stomach volume resulting from both surgical procedures (gastric bypass and sleeve gastrectomy) has a number of advantages which include the need for less food in order to feel full and a reduction in the production of ghrelin; the hormone responsible for signalling hunger. Despite their advantages, these surgical procedures are not without risks which include post-operative bleeding (< 1%), leaking (0.16%) and small bowel obstruction (0-2%) (Schroeder et al., 2011). Furthermore, the gastric bypass causes vitamin deficiency as a result of food bypassing the part of the small bowel responsible for vitamin absorption. Consequently, individuals are required to consume vitamin and mineral supplements to prevent problems associated with deficiencies (Schroeder et al., 2011). The risk of mortality after 30 days for both gastric bypass and sleeve gastrectomy is estimated at 0.4-0.7%, and 0.3%, respectively. The majority of post-operative deaths have been attributed to blood clots and leaks as a consequence of cutting and stapling procedures (Chang et al., 2014).

In a meta-analysis of 164 studies, Chang and colleagues examined the effectiveness and risks of bariatric surgery from 2003 to 2012. A total of 161,756 patients were included of which 79% were female. Across the 69 studies that documented change in BMI at least 1 year post-operatively, gastric bypass produced the most significant body mass index loss in the first year post-surgery. Of all the procedures included in the study (Roux-en-Y gastric bypass; gastric banding; sleeve gastrectomy; non-surgical interventions), gastric bypass consistently produced the largest effects in weight change outcomes each year post-surgery. However, among 11 studies that recorded change in BMI up to 5 years post-surgery, change in BMI decreased from year 4 to 5 by approximately 2 BMI points, with an average percentage change in BMI of 76% to 64%. These findings provide substantial support for the efficacy of weight-loss surgery in producing immediate weight-loss far beyond that achieved by any other intervention. However, these results also highlight the gradual reduction of these effects over time.

The quantity of weight regain observed in post-bariatric surgery individuals has varied across studies. In their review of literature regarding post bariatric surgery outcomes, Hsu et al. (1998) found weight regain ranged between 5 - 8 kilograms from 1 – 3 years follow-up. Other studies have shown an average regain of anywhere between 5% to 25% of the lost weight after surgery over a 10 year period (Johnson Stoklossa & Atwal, 2013), while Magro and colleagues found an increase in weight regain ranging from 46 – 64% between 2 – 4 years post-surgery.

While much is known about the physical outcomes of weight-loss surgery, the psychosocial impacts are less clear. Few studies have focused on the prevalence of psychological comorbidities among individuals seeking bariatric surgery which may in part be explained by the absence of standard guidelines regarding the inclusion of psychological assessment and monitoring in the pre- and post-operative stages. Assessment therefore varies widely across clinics that perform weight-loss surgery, ranging from a single appointment pre-screening of psychiatric illness performed by a bariatric surgery nurse specialist or surgeon to a more thorough assessment comprised of multiple appointments with a psychologist, as outlined in Weight Loss Surgery Limited’s assessment process.

Bariatric surgery literature, including meta-analyses reflect between 21 and 61% of weight loss surgery candidates experience psychiatric illness pre-operatively (Castaneda et al., 2019). Studies have indicated a higher prevalence of pre-operative psychological comorbidities among individuals seeking bariatric surgery such as mood disorders, disordered eating, low self-esteem and psychological distress compared to the general population and individuals with obesity who do not seek surgical intervention (Castaneda et al., 2019; Duarte-Guerra et al., 2016; Mitchell et al., 2013; Osterhues et al., 2017). Psychiatric comorbidities are frequently highlighted as a contraindication to surgery, with individuals being declined on this basis and left with the responsibility of sourcing their own support to address these difficulties. However, there exists controversy around this exclusion of weight loss surgery candidates given individuals with psychiatric comorbidities may still experience improved health outcomes postoperatively if adequate support is provided in pre and post-operative care provision (Jumbe et al., 2017; Peterhänsel et al., 2013).

These issues raise significant concerns for the potential implications of bariatric surgery on mental health in a population that is considered at greater risk at baseline. However, little consideration has been given to the potential impacts of the surgery process itself on psychological wellbeing and in particular, eating pathology. For example, efforts to lose weight in order to receive surgery may strengthen pre-existing dietary rigidity while prescribed dietary restriction post-surgery may worsen pre-existing problematic eating or alternatively, increase the risk for developing disordered eating among patients previously unaffected (Conceição et al., 2015; Marino et al., 2012; Watson et al., 2020).

While research has reported short-term significant improvements in psychosocial status following weight loss surgery including social relations and employment opportunities (Herpertz et al., 2003; Ogden et al., 2006), negative psychosocial outcomes within 24 months post-surgery have also been found. These include an increase in depressive symptoms following initial decrease in symptoms, the onset of frequent eating known as ‘grazing’, and the persistence of binge eating, all of which negatively impact post-operative weight loss

(Castaneda et al., 2019; Jumbe et al., 2017). In addition, suicide risk is increased following surgery, as reflected in a meta-analysis of 29 studies that indicated mortality from suicide after surgery was 2.7 per 1000 patients (Castaneda et al., 2019). Compared to the general population and age, sex, and BMI matched controls, bariatric surgery individuals were found to have a 2-fold increase in risk of attempted suicide or self-harm after surgery (Castaneda et al., 2019). Possible explanations for this increased risk include weight regain, re-occurrence of comorbid medical disease (Mitchell et al., 2013; Peterhänsel et al., 2013), and new or re-emerging disordered eating or addictive behaviours (Neovius et al., 2018). Additionally, it is possible that unrealistic or unmet expectations that surgery would provide the 'cure' for pre-existing difficulties causes increased distress and hopelessness, further heightening one's risk of suicidality (Kovacs et al., 2017). Taken together, these findings highlight the importance of providing psychological assessment and support to meet the psychosocial needs of bariatric surgery candidates in order to improve wellbeing outcomes post-operatively.

Bocchieri, Meana, and Fisher (2002b) conducted semi-structured interviews and focus groups among 31 post-gastric bypass surgery individuals to investigate how surgery had personally impacted their lives. Several positive outcomes were found including increased energy and confidence, and improvements in occupational outcomes; all of which in turn, enhanced individuals' outlooks regarding their future. Nevertheless, changes were not exclusively positive as surgery also induced multiple tensions. Paradoxically, a portion of individuals recognised that weight had served to preserve their self-esteem, as they had used their size as an excuse to avoid challenges. Similarly, surgery enabled many individuals to recognise they had used eating as a coping mechanism to protect themselves from anxiety provoking situations. Initially, these individuals were able to rely on the physiological mechanisms of weight-loss surgery to manage their eating such that any departure from post-surgical diet guidelines induced aversive physical consequences (Bocchieri et al., 2002b).

However, as stomach capacity and food tolerance increased over time, psychological methods of regulation were necessary. Those who identified themselves as “emotional eaters” reported difficulty with adjusting to the eating behaviours required to sustain their weight-loss. This difficulty was in part, attributable to the challenge of discarding eating as a primary coping response to negative emotions and developing alternative coping strategies.

Tension in relation to self-concept changes was also highlighted from individuals post weight-loss surgery (Brocchieri et al., 2002b). The sudden changes in physicality, health and mood can generate self-doubt and uncertainty regarding one’s own identity. Furthermore, individuals may have to adjust their values system in order to commit to maintaining ongoing self-care after surgery. For example, prioritising one’s own wellbeing postoperatively may feel incongruent with previously held values and subsequently may generate a sense of inner conflict.

This notion of conflict can be further understood in the context of Personal Construct Theory (PCT; Kelly, 1991). PCT posits that individuals develop theories about the self and the world comprised of personal constructs that each have two extreme points. Cognitive conflicts (known as implicative dilemmas) occur as a result of an implicit association between two constructs; one of which the individual wants to change and the other the individual values (the congruent construct) (Feixas et al., 2009). The desired change is associated with an undesired implication on the congruent construct. In the context of weight-loss surgery, the desired change may be to be thinner which may be perceived by the individual as a self-focused desire and thus imply selfishness; a construct they do not want to associate with. Hence, post weight-loss surgery individuals may be motivated to maintain their health but also anticipate that doing so makes them selfish. Consequently, if the negative implications of this threaten individual identity, resistance to change will ensue and maintenance of weight-loss will be compromised. In support of this theory, Escandon-Nagel et al. (2017) recently found evidence of moderate rates of cognitive conflict among individuals with obesity and high rates among individuals with obesity with binge eating disorder. This highlights the need to identify the content of these cognitive conflicts among individuals post weight-loss surgery and develop specific interventions to ensure these are adequately addressed.

Regarding the social impacts of weight-loss surgery, measuring change in weight-stigma proves difficult. This is because stigma exists in many subtle forms and self-reports of prejudicial behaviour are inevitably uncommon. Measuring discrimination is similarly problematic, given the complexity of differentiating actual discriminatory actions from cognitive distortions associated with body image dissatisfaction and low self-esteem (Williamson et al., 2004). It is, however, possible to speculate that postoperative increases in social contacts, activities, and occupational functioning may partially indicate reduced stigmatisation, in addition to improvements to self-esteem, confidence, physical health, energy, and mobility (Bocchieri et al., 2002a).

Exploration of changes to relational dynamics following surgery have demonstrated mixed findings (van Hout et al., 2006). A portion of individuals noted romantic relationship improvements which they attributed to improved energy, mood, and self-confidence (Bocchieri et al., 2002b). Patients with children also described improvements in their perception of their own parenting abilities based on both the enhanced quality, and quantity of time spent with their children.

Disparately, a separate group of patients in the same study described newfound tension in their relationships following surgery (Bocchieri et al., 2002b). In particular, many individuals who acknowledged being dependent on their significant others pre-surgery, reported increased independence postoperatively causing partners to feel unneeded and insecure. Bocchieri et al.’s (2002b) findings suggest that for some, surgical outcomes enhance interpersonal relationships, while for others the impact of surgery-induced lifestyle adjustments can cause tension and relationship discord.

Similar variation has also been identified in a systematic review of post-surgery psychosocial outcomes (van Hout et al., 2006). Several studies reported significant improvements in social quality of life including improved marital relationships, sexual functioning, and social networks (van Hout et al., 2006). Although improvements in social networks may appear unequivocally positive, some individuals described difficulty adjusting to the increased attention they received. A portion of individuals described experiencing both a sense of relief and resentment towards their newfound social acceptance while others questioned whether their new friendships would exist at their preoperative weight (Bocchieri et al., 2002b).

Another principal area to consider is the degree to which surgery improves eating disturbances. This is of particular relevance given its significance to our increased understanding of failed weight-loss outcomes. In the first year following surgery, normalisation of eating patterns have been reported, including increases in eating restraint and decreases in binge eating, emotional eating, and external eating (van Hout et al., 2006). In addition, Bocchieri and colleagues (2002a) noted several studies that found significant decreases in bulimic episodes (characterised by bingeing and purging behaviour), secretive eating, and meal portions. Based on these findings alone, it would be reasonable to conclude that surgery has the ability to indirectly resolve pre-existing eating disturbances.

However, it is possible that these improvements are also partly attributable to the impossibility of overeating due to stomach size reductions and associated physiological changes. This is supported by self-reports of individuals who disclose they would still engage in their old maladaptive eating patterns if it were not for the adverse physical side effects of doing so (Powers et al., 1997; Rabner & Greenstein, 1991). Yet, as individuals adjust accordingly, eating disturbances can re-emerge as individuals begin to experiment with their food intake. Research illustrates weight-regain to typically coincide with this experimental stage that generally occurs between 1 and 2 years post-surgery (Bocchieri et al., 2002a; van Hout et al., 2006). Over this time, individuals may transition from bingeing to grazing behaviour (continuous snacking throughout the day), as supported by several studies of post-operative eating behaviour (Colles et al., 2008; Sarwer et al., 2008; Sjöström et al., 2004). Additionally, foods high in carbohydrate content are often swapped for energy-dense foods in soft/liquid form.

The gradual decline of external reinforcers may further contribute to postoperative eating disturbances and associated weight regain. In the initial stages of weight-loss, patients report an increase in social attention which may serve to enhance self-esteem and adherence to postoperative dietary guidelines (Bocchieri et al., 2002a). However, the positive feedback from others inevitably subsides as weight stabilises and at this point, individuals may resort to their pre-existing eating-related methods of reassurance.

Ogden and colleagues (2006) conducted a qualitative study exploring the eating behaviours of 15 individuals who underwent surgery up to 4 years prior. For all participants, the physiological effects of weight-loss surgery had the most significant influence on eating behaviour in the initial post-operative stages. The inability to consume large amounts resulted in a more careful consideration of food choices irrespective of accessibility (Ogden et al., 2006). This, in conjunction with the unpleasant physical side effects led to healthy dietary improvements in half of the sample. Interestingly, the way in which surgery altered individuals' relationship with food varied across the sample. Some described having a more pragmatic relationship with food and of those, a portion no longer associated food with enjoyment. In contrast, many still found food pleasurable despite being more selective about what they ate. Participants' sense of control over their intake also differed across the sample.

Some perceived their food intake to be primarily controlled by their stomach while others felt they had internalised this control (Ogden et al., 2006). Based on these results, it seems that for some, surgery has the ability to positively impact an individual's relationship with food, while for others surgery may not alter, but rather temporarily neutralise their relationship with food.

In sum, although weight-loss surgery has been unequivocally efficacious in producing substantial weight-loss among obese individuals, the degree of weight-loss appears to be highly varied even among those who have undergone the same procedure. Furthermore, as corroborated by multiple studies (Chang et al., 2014), these effects are often temporary with improvements lasting less than 5 years for 70% of individuals. Between 20-50% of surgical patients experience weight regain within 24 months following surgery (Johnson Stoklossa & Atwal, 2013; Magro et al., 2008), although it is challenging to accurately determine the incidence of weight regain due to loss of patients to follow up over the long term (Magro et al., 2008).

In addition to weight regain, some individuals can experience various negative psychosocial outcomes that reduce quality of life (Bocchieri et al., 2002a). These findings suggest that although surgery is a useful tool for initiating weight-loss, it is unable to remedy long-standing eating and weight difficulties for a substantial portion of individuals. Long-term postoperative success is likely to be obstructed by unresolved problematic eating behaviours that pre-exist surgical intervention and contribute to both pre, and postoperative weight gain. This therefore warrants further investigation of psychological interventions that target the psychological constructs that underpin disordered eating in order to improve the long term outcomes of weight-loss surgery.

3.1.2. Behavioural Interventions

Current treatments for obesity primarily consist of behavioural interventions that target topographical variables such as diet and exercise (Ash et al., 2006; Foster et al., 1997; Wilson, 1996). Yet, their ability to facilitate reductions in weight loss is modest, with most outcome studies showing a 5–10% weight loss which is unlikely to produce worthwhile benefits for those with obesity (Ash et al., 2006; Stroebe, 2008). Nevertheless, even this modest weight-loss has been associated with significant health benefits including clinically significant improvements in cholesterol, glucose, and blood pressure levels (Barte et al., 2010).

To investigate the efficacy of behavioural treatments for weight-loss, Dombrowski et al. (2010) conducted an experimental study involving the random assignment of obese individuals with comorbidities to three interventions comprised of diet-only, physical activity-only, and a combination of diet and physical activity methods. Results showed that diet-only interventions facilitated significant changes in cholesterol, blood pressure and triglyceride levels which were typically observed 3 and 6 months into the treatment. Comparatively, the physical activity-only condition was unsuccessful in reducing obesity-related risk factors; the diet and physical activity intervention produced the largest reductions in risk factors which peaked at 1 year post-intervention (Dombrowski et al., 2010). Weight-loss maintenance at 1 year follow-up was also largest in this condition, corroborating previous findings that support the weight-loss efficacy of combined (diet and physical activity) interventions relative to interventions that target either diet or physical activity alone (Sharma, 2007; Wu et al., 2009).

However, the efficacy of combined behavioural interventions in producing behaviour change was dependent upon whether behaviours were targeted in isolation or concurrently (Dombrowski et al., 2010). Changes in diet and exercise were greatest when these behaviours were addressed at separate stages within the same intervention. This may be partly due to difficulties in exerting self-regulatory resources for both behaviours at the same time (compared to a single behaviour) and consequently, the extent of change in both behaviours may be compromised.

While evidence supports the short term efficacy of behavioural interventions, sustaining permanent lifestyle changes has proven difficult for individuals with obesity. Weight-loss maintenance has been consistently identified as an ongoing issue across several studies (Cooper et al., 2010; Dombrowski et al., 2010; Sharma, 2007). Between 40 – 50% of weight is regained within the first year following behaviour change, while the majority of individuals return to their baseline weight within 3 – 5 years (Barte et al., 2010; Cooper & Fairburn, 2001; Dombrowski et al., 2010; Ogden et al., 2006).

Results from Dombrowski et al.'s (2010) experimental research found reductions in kilocalorie (kcal) intake among participants were on average, at least half of their size at 12 months (-138 kcal) compared to 6 months (-360 kcal) post-intervention. Given that most behavioural interventions suggest a 1200-1500 kilocalorie intake (approximately 600 kcal less than the average daily intake), this suggests that individuals' motivation to adhere to dietary rules gradually depletes over time.

This may in part, be attributable to the reciprocal relationships between weight-loss, dieting, and mood. As proposed by dietary restraint theory, significant adjustments to food intake result in physiological and psychological changes that can increase one's preoccupation with food (Canetti et al., 2002). Weight-loss is likely to be met with increased hunger cues driven by the body's attempt to return to its homeostatic baseline (highest set-point weight). Efforts to resist these cues may serve as a competing cognitive demand to the cognitive resources required for continued dieting and thus may contribute to diet maintenance becoming more difficult over time. Additionally, failure to respond to the increased desire to eat can induce negative emotional changes including low mood, agitation, and anxiety (McIntosh et al., 2006). In accordance with dietary restraint theory (Herman & Mack, 1975) and the transdiagnostic model of disordered eating (Fairburn et al., 2003), these mood changes are likely to heighten the risk of overeating.

An alternative reason for weight-regain could involve the degree of initial weight-loss generated by behavioural change. For individuals with obesity, a 5-10% weight reduction is likely to result in modest benefits. While this degree of weight-loss has been associated with health improvements, these are dependent upon maintenance of this new weight (Raman et al., 2013). Congruent with the over-evaluation of shape and weight proposed by the transdiagnostic approach, individuals with obesity frequently endorse appearance as their strongest motivator for weight-loss. It is possible that the modest weight-loss achieved from behavioural interventions is substantially less than individuals' expectations such that adherence to the behavioural regime fails to satisfy appearance goals (Ogden et al., 2006).

Consequently, individuals may feel demotivated as the efforts given to behaviour change do not seem worthwhile; this in turn, leads to abandonment of these efforts. Following a lapse, many individuals will make no further effort to revert to their 'new' lifestyle as they continue to undervalue their achievement and appraise their weight as uncontrollable. Alternatively, those who continue feeling driven to maintain their weight-related goals are likely to experience future lapses precipitated by hunger, fatigue, and deprivation, as a result of prolonged dietary restraint (Cooper & Fairburn, 2001).

A handful of studies have identified predictors of commitment to weight-management behaviours which include autonomous, intrinsic motivation (Williams et al., 1996), self-monitoring of behaviour, high self-efficacy, and social support (Elfhag & Rössner, 2005; Teixeira et al., 2015). Other factors that might increase adherence to diet and exercise methods include developing a flexible approach to dietary restraint such that foods are not forbidden but are consumed in moderation (Elfhag & Rössner, 2005; Teixeira et al., 2010; Westenhoefer et al., 2013). Comparatively, dichotomous thinking, limited coping strategies, and external motivations to lose weight such as social pressure, have been hypothesised to compromise maintenance; however, these factors are yet to be empirically evaluated.

3.1.3. Cognitive Behavioural Therapy

Given the poor long-term efficacy of behaviour therapy for obesity, interventions that address weight maintenance are required. Cognitive Behaviour Therapy (CBT) is founded on the behavioural principles of classical and operant conditioning, as well as socio-cognitive learning principles that focus on the modification of maladaptive thoughts, feelings, and behaviours. In attempt to improve weight-loss outcomes in obesity, Cooper and Fairburn (2001) developed a CBT programme for obesity based on the largely successful CBT for Bulimia (Fairburn, 2008; Fairburn et al., 1993). Comprised of two stages over 44 weeks, the therapy firstly aimed to produce weight loss through dietary restriction and increased physical activity. The second stage was designed to address psychological factors that may impair weight maintenance including inaccurate monitoring of food intake, poor food choice, binge eating, and snacking (Cooper & Fairburn, 2001). Individuals were provided 24 one-on-one sessions with a therapist. Underpinning this therapy was the assumption that weight regain results from nonadherence to diet and exercise prescriptions following treatment. This is precipitated by self-doubt about one's ability to control their weight which is thought to be influenced by the inevitable decreases in weight-loss trajectories after approximately 6 months of behaviour change (Cooper & Fairburn, 2001). In addition, the modest weight-loss that has been achieved may further perpetuate self-doubt surrounding the attainability of individuals' weight-loss goals.

Cooper et al. (2010) studied the short and long-term effects of CBT for obesity compared with standard behaviour therapy (BT) and guided self-help (GSH). Similar to CBT, BT was conducted over 44 weeks with the aim of changing eating habits and increasing activity levels. Different to a substantial portion of other behavioural interventions, individuals were given the choice to continue weight-loss or focus on weight-maintenance midway through the treatment. The GSH condition lasted 24 weeks and focused on an energy intake restriction of 1200 kcal daily, healthy food choices, and increased physical activity. Two face-to-face sessions with a therapist were included and contact thereafter consisted of 15, 20-minute phone sessions.

Results of this study varied, with nonsignificant differences in percentage weight loss between BT and CBT (Cooper et al., 2010). Significantly larger improvements in weight and eating behaviour were found in the BT and CBT conditions compared to the GSH condition. In terms of weight-loss maintenance, 99% of BT and CBT participants regained weight post-treatment. Individuals regained almost half of their lost weight at 1 year follow-up (44% median weight regain in BT and 58% in CBT) as did a significant portion by three years-follow up (median regain 90% in BT and 89% in CBT).

With regards to eating behaviour, this study revealed notable findings. Of those who endorsed binge eating at baseline, a 16% decrease in reported binge eating was observed at the end of treatment, and this group lost more weight (12%) than their non-bingeing counterparts (9%) (Cooper et al., 2010). While these findings lend support to the efficacy of BT and CBT interventions in reducing eating disordered symptoms, 8% of the 114 total participants who denied any episodes of binge eating at baseline endorsed binge eating at the end of 44 weeks. It is therefore possible that BT and CBT interventions may have been effective in reducing pre-existing disordered eating behaviours for a portion of individuals, whilst increasing the risk of binge eating for others. Given that eating behaviours relied on self-reports, it is possible that a portion of individuals felt uncomfortable endorsing binge eating at baseline or alternatively, failed to identify their eating behaviour as bingeing.

Following treatment, these individuals may have reappraised their eating behaviour as bingeing and felt more comfortable disclosing this. Nonetheless, these conclusions are speculative and future research is required in order to more accurately discern these findings.

Despite CBT in this study addressing factors hypothesised to interfere with weight maintenance, it was no more effective than standard BT (Cooper et al., 2010). Furthermore, both interventions were unsuccessful in extending the initial post-treatment effects leading researchers to conclude that obesity is resistant to psychological treatment methods and future efforts should centre on prevention. It is possible that these results reflect the inaccuracy of the theory that underpinned CBT for obesity, despite the effectiveness of CBT for Bulimia which is based on similar cognitive principles.

Alternatively, the topographical focus of CBT may have limited its efficacy as a sole focus on dieting and physical activity may be effective in delaying weight regain yet insufficient to produce long-lasting benefits. Research suggests that psychological factors that extend beyond eating and exercise behaviour including low distress tolerance, over-evaluation of physical appearance and low self-esteem are implicated in the etiological profile of obesity and should therefore be key treatment targets (Burton & Abbott, 2017; Fairburn et al., 2003; Herman & Mack, 1975; Lacey, 1986). In view of these empirical findings, it is necessary to evaluate other theoretical perspectives particularly those that address these shortcomings.

3.1.4. Acceptance and Commitment Therapy

Research findings suggest that Acceptance and Commitment Therapy (ACT) may be a useful option for the treatment of eating pathology given that its core constructs (including experiential avoidance, mindful awareness, and cognitive fusion) appear central to the development and maintenance of disordered eating patterns (Cockell et al., 2002; Hill et al., 2015; Juarascio et al., 2013; Masuda & Hill, 2013).

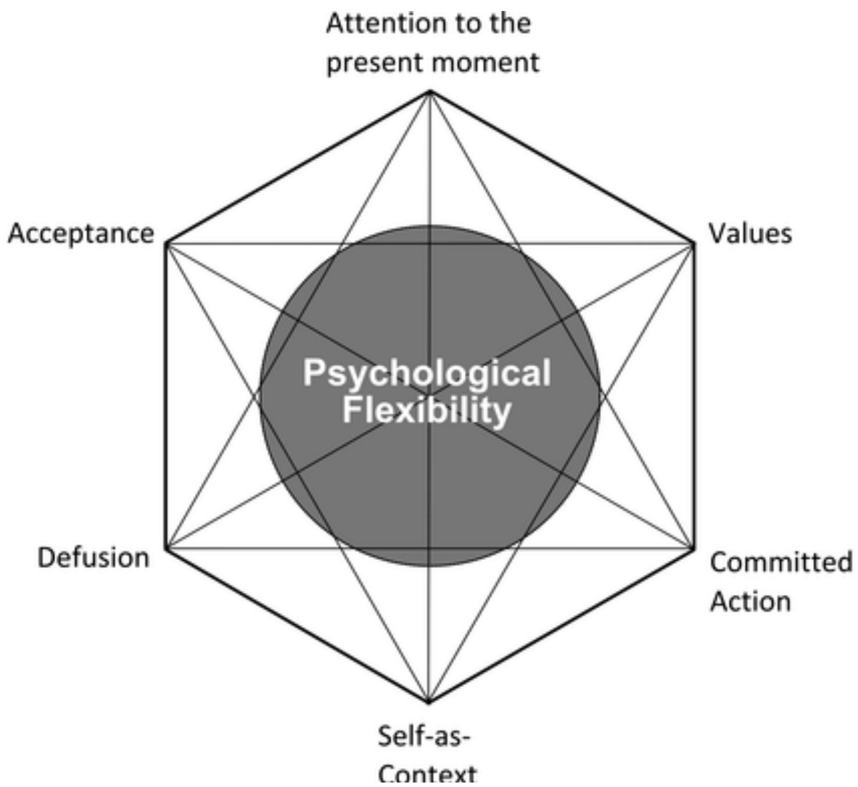
ACT is built from Relational Frame Theory (RFT; Hayes et al., 1999) which posits human language and cognition are based on derived arbitrary relations between stimuli and events (Hayes et al., 2005). Individuals assign meanings to words and events which comprise cognitive constructs that underpin one's beliefs and experiences. It is how one event alters another related event that makes RFT clinically relevant. For example, individuals with eating disturbances may have learned that loneliness or sadness is 'bad'. Consequently, they engage in overeating as a form of experiential avoidance which refers to attempts to avoid these aversive internal states (thoughts, memories, physiological sensations) even when doing so is harmful in the long-term (Hayes et al., 1996). While it may be possible to limit the frequency of negative emotional experiences, RFT posits that negative emotions are an inevitable aspect of the human condition and are therefore unavoidable in the long-term. This is because relational frames allow aversive emotions to occur across various settings and situations; consequently attempts to ameliorate their presence prove ineffective while paradoxically strengthening the relational frames that underlie them (Hayes et al., 1999).

The focus of ACT is to promote a rich and meaningful life by expanding psychological flexibility which involves taking an open, willing, and non-judgmental stance to the full range of one's internal experiences (Hayes et al., 2016). This is fostered through addressing six interrelated processes that are collectively referred to as the Hexaflex model as displayed in Figure 2. These processes include experiential acceptance, present moment awareness, self as context, cognitive defusion, values and committed action and will be outlined in the subsequent sections below in the context of obesity management (Hayes et al., 2016).

ACT may be particularly effective in addressing maladaptive eating behaviours for individuals with weight-management issues for the following reasons. First, engagement in disordered eating behaviours can be precipitated by experiential avoidance. Second, healthy eating patterns in pursuit of weight-loss and/or weight management require psychological flexibility as individuals must constantly make choices in conflict with intrinsic preferences that favour overeating, and external cues that discourage physical activity. For example, individuals with obesity seeking weight-loss must accept urges to overeat and internal discomfort from hunger, cravings, and negative affect while the ability to withstand fatigue and unpleasant physical states must also be possible in order to commit to regular physical activity (Hayes et al., 2016).

Figure 2

The ACT Hexaflex Model.



With regards to the components of the Hexaflex model, experiential acceptance involves practicing non-judgemental awareness to internal and external events and can be viewed as the opposite of experiential avoidance, that is, efforts to avoid unwanted internal experiences. This could involve noticing the discomfort produced by a food craving without engaging in efforts to distract or mitigate this sensation.

Present moment awareness refers to becoming acquainted with the sensory experiences of the present moment by engaging in behaviours more mindfully (Haynos et al., 2016). This can help to increase awareness of automated cognitive processes that may lead to problematic behaviours that may provide short term relief despite long term negative consequences (Hayes et al., 2016). In the context of overeating, lack of awareness surrounding one's eating choices often results in mindless eating to satisfy internal cues (Haynos et al., 2016). This makes behaviour change particularly difficult, as many of these decision processes operate implicitly and awareness is gained only after these decisions have been made. For individuals with obesity, this may induce feelings of guilt or further perpetuate the negative affect that potentially precipitated poor quality of food intake. Thus, ACT encourages the deliberate application of psychological skills that decrease one's reactivity to temporary aversive internal experiences, such as mindfulness (Forman et al., 2009). These skills assist individuals to behave independently of their aversive emotional experiences and further promote ongoing self-regulation (Hayes et al., 2016).

Self as context is another central principle of ACT and involves contacting the 'observing self', the part of oneself that exists separate to one's experiences. It refers to recognising the transient nature of all emotions, thoughts, and actions, relative to the stability of the conscious self (Hayes et al., 2016). By doing so, one is able to view themselves beyond tightly held beliefs about oneself that may be psychologically harmful and distressing such as self-judgmental beliefs about one's physical appearance (Hayes et al., 2016). Adopting the self as context perspective also facilitates cognitive defusion: the ability to separate the self from thoughts and emotions in attempt to decrease their influence on behaviour. This aligns with the ACT view that it is not thought content that is inherently problematic; rather it is how fused an individual is with their thoughts (cognitive fusion) and their subsequent efforts to avoid their related aversive mood state (experiential avoidance). Cognitive defusion is achieved by appraising thoughts for what they are as opposed to what they say they are. For example, an individual who thinks "I am fat" is encouraged to appraise this as a product of their mind rather than a self-evident fact (Ruiz, 2010). This is particularly relevant for individuals who frequently encounter negative thoughts related to their weight which in turn, increase negative affect and heighten the risk of overeating. Useful cognitive defusion techniques involve verbalising the thought in the following format, "I am having the thought…" as to undermine its power. Furthermore, cognitive defusion may reduce cognitive rigidity, specifically in relation to thoughts about diet failure; this may, in turn, mitigate the likelihood of future episodes of overeating and reduce the cycle of restriction and overeating (Palmeira et al., 2017).

Values refers to the process of defining what is most meaningful to an individual in their life. This entails connecting to a deeper sense of what matters and recognising qualities of behaviour that one would like to live in alignment with. Clarifying one's values is an essential prerequisite to committed action; the process of taking steps towards valued goals, even when doing so requires accepting uncomfortable thoughts and feelings (Hayes et al., 2016). As motivation to engage in weight management behaviours decreases over time, goals based on self-determined values are necessary to withstand these motivation lapses, accept internal discomfort, and sustain long-term committed action. Therefore, ACT emphasises values clarity by encouraging individuals to carefully consider the purpose to their actions in various domains of their life (Weineland et al., 2012b). This process has proven beneficial for weight-loss as indicated by a randomised controlled trial that compared a one-day ACT workshop (n = 40) that primarily focused on core life values identification to a no treatment control group (n = 44) (Lillis, 2008). Results showed significantly better physical outcomes for the ACT group including a 1.4% average weight-loss at three months follow-up, which supports the influence of values in improving ongoing commitment to healthy diet and exercise regimes.

Though it is relatively new in the weight management literature, ACT-based interventions have demonstrated efficacy in improving eating and exercise behaviours, disordered eating attitudes, and weight loss maintenance (Butryn et al., 2011; Forman et al., 2007; Kristeller & Hallett, 1999; Lillis et al., 2009; Pearson et al., 2012). To date, mindfulness strategies have been particularly effective in reducing a range of problematic eating behaviours including overeating, subjective binge eating, emotional eating, eating restraint, and disinhibited eating (Alberts et al., 2012; Godfrey et al., 2015; Lillis et al., 2009; Palmeria et al., 2016). Current findings suggest that mindfulness does this by effectively addressing various psychological correlates of disordered eating behaviours.

Specifically, Alberts et al. (2012) reported that individuals with problematic eating behaviours showed significantly lower levels of dichotomous thinking, body dissatisfaction, and emotional and external eating following an 8 week mindfulness based cognitive therapy intervention compared to a wait list control group. The results corroborate an expansive research base that demonstrates mindfulness facilitates cognitive defusion which subsequently decreases dysfunctional thinking patterns (Alberts et al.,2012).

The reductions in emotional and external eating may be attributed to the increased focus on remaining present and the acceptance of negative emotional experiences. In this manner, mindfulness may decrease impulsivity which commonly underpins maladaptive eating patterns. The emphasis on accepting uncomfortable thoughts and feelings in a non-judgmental manner cultivates self-compassion; a concept highly incompatible with the inherently judgmental thoughts pertaining to body image concerns (Lillis et al., 2009).

Further, encouraging non-judgmental observations directly challenges dichotomous thinking that seeks to identify experiences as ‘good’ or ‘bad.’

Interestingly, Alberts and colleagues’ (2012) study observed less pronounced weight-loss in the intervention group compared to the control group. This was perhaps unsurprising given that weight loss was not the primary focus of the intervention. Nevertheless, it is possible that the psychological adjustments that occurred may result in more long-term success with weight management over time.

Preliminary support for the effectiveness of ACT principles in improving weight-loss behaviours has also been found in an exploratory single-group design of 29 overweight or obese individuals (Forman et al., 2009). Acceptance-based strategies including mindfulness, distress tolerance techniques, and commitment enhancement were added to a well-established 12-week behavioural intervention for weight loss (LEARN; Brownell, 2004). Participants appraised acceptance-based strategies including “urge surfing” (observing eating urges from a distance) and cognitive defusion as useful for increasing adherence to weight management behaviours. Changes in ACT-related variables including motivation, experiential avoidance, emotional eating and mindfulness were observed from baseline to post-intervention and in turn, were associated with weight loss at post-intervention and 6 months follow-up.

Echoing these findings, Tapper et al., (2009) suggested that BMI changes following a 4-session ACT workshop were mediated by decreases in binge eating which in turn, were attributed to improvements in participants’ cognitive defusion abilities. Thus, these results tentatively support the main premise of ACT for weight control which posits that improved psychological flexibility enhances long-term weight loss. However, formal mediational analyses were absent from both studies and consequently more robust analyses are warranted to fully understand how ACT facilitates positive weight management outcomes.

Similar results were found in another study comparing the outcomes of a one-day ACT workshop to a control group (Lillis et al., 2009). In addition to improved weight-loss maintenance and quality of life among intervention participants, ACT was also efficacious in decreasing binge eating and weight self-stigma. The authors hypothesised that binge eating reductions likely mediated the effect of ACT on weight-loss. Despite promising results, the lack of statistical mediational analyses precluded the authors' from confirming that binge-eating mediated this effect. However, in accordance with their hypotheses, a reanalysis of Lillis et al.'s (2009) study confirmed that reductions in experiential avoidance and weight self-stigma fully mediated decreases in binge eating, which in turn, mediated changes in weight (Lillis et al., 2011).

Similarly, these findings were corroborated by Palmeira et al. (2017) who found that reductions in weight self-stigma were mediated by decreases in shame and weight-related experiential avoidance, and increases in self-compassion. Interestingly, the observed reductions in weight self-stigma occurred independently of weight-loss in both studies. This could reflect the success of acceptance-based skills and cognitive defusion in enhancing participants' psychological flexibility such that individuals were more able to accept their current physical state and distance themselves from negative self-directed thoughts irrespective of their objective weight. Based on this interpretation, it could be hypothesised that long-term positive psychological outcomes are expected from this study given that cognitive fusion has been known to contribute to predictors of weight regain (Byrne et al., 2003).

Additional mediational analyses conducted by Forman and colleagues (2013) found that experiential avoidance of food-related internal experiences (hunger, cravings) was shown to partially mediate benefits of an acceptance-based behavioural intervention for individuals with obesity, but only among highly emotional eaters (Forman et al., 2013). Moreover, the acceptance based intervention was most effective among participants with high levels of mood disturbance (Forman et al., 2013). Consistent with ACT's focus, these results suggest that those who are most vulnerable to dysregulated mood states and eating in response to internal and external cues greatly benefit when these factors are targeted directly.

3.1.4.1. ACT in the Weight-loss Surgery Population. Currently, investigation of acceptance and commitment-based approaches with weight-loss surgery patients is limited. From an ACT framework, weight-loss surgery offers a temporary solution to negative internal experiences such as body dissatisfaction and self-stigma (Haynos et al., 2016; Weineland et al., 2012a). However, as hunger and interest in food gradually returns, and adherence to restrictive postoperative dietary regulations becomes more challenging, individuals may encounter increased difficulty in numbing, distracting, or soothing their unpleasant emotional experiences and resort back to their unresolved disordered eating behaviours to do so (Kinzl et al., 2003). This is most likely for individuals who utilise overeating as a form of experiential avoidance, given the inevitability of encountering uncomfortable emotions post-surgery (Haynos et al., 2016). For example, a portion of individuals experience increased body dissatisfaction after weight-loss surgery, while many report that the initial improvements in psychosocial status gradually diminish over time (Rudolph & Hilbert, 2013). Therefore, in order to enhance surgical outcomes, implementing a treatment that targets experiential avoidance, such as ACT, is indicated.

Presently, only 2 studies have evaluated ACT-based interventions for weight-loss surgery individuals. The first, a pilot randomised controlled trial ($N = 39$) evaluated an ACT programme comprised of 8 weekly sessions; 6 online sessions and 2 face to face appointments (Weineland et al., 2012a). ACT participants ($n = 19$) had undergone bariatric surgery at least 6 months prior and results were compared to a treatment as usual (TAU) group ($n = 20$) who received follow-up care from a surgeon, bariatric nurse, and dietician who administered postoperative dietary guidelines. As expected, and in accordance with literature of weight control issues, baseline measurement scores for all participants endorsed clinically significant disordered eating behaviours, body dissatisfaction and weight maintenance as problematic. Significant differences between the two conditions in favour of the ACT group were shown across quality of life, eating disordered behaviours, body dissatisfaction and acceptance of weight-related thoughts and feelings.

Notably, the extent of improvement in eating disordered behaviours reached clinical significance at post-intervention in that for some, eating behaviour was no longer deemed disordered, therefore demonstrating ACT's practical relevance (Weineland et al., 2012a). A 6 month follow-up evaluation of the prior measured constructs found that ACT produced superior long-term outcomes regarding body shape concerns however, the difference in weight-concerns between the ACT and TAU conditions were no longer significant (Weineland et al., 2012b). Nevertheless, this was mainly attributed to improvement in the TAU condition as opposed to regression in the ACT condition, as improvements remained substantial.

Corroborating similar evaluations of the influence of experiential avoidance on ACT treatment outcomes, results indicated weight-related experiential avoidance mediated the impact of ACT on body dissatisfaction, disordered eating, and quality of life (Weineland et al., 2012b). Thus, improved psychological flexibility appears to reduce efforts to change weight-related thoughts and emotions and this in part, may enhance quality of life. This was the first study to show the long-term efficacy of ACT in producing psychological and physical benefits alongside weight-loss surgery and to examine the mechanisms that underpin these outcomes.

In addition to these findings, Bradley et al.'s (2016) more recent pilot study supports the efficacy of a 10-week ACT intervention in improving weight management within a sample of 11 post-surgery individuals experiencing weight regain of at least 10% of their postoperative weight loss. Participants lost an average of 3.58% of their pre-intervention weight thus intercepting their weight regain trajectory. Given the likelihood of weight-related comorbidities returning as a result of weight regain, this finding has potentially positive health implications for these individuals. Significant reductions in disinhibition and internal responsivity to food cues were also observed, both of which have been previously associated with greater postoperative weight-loss outcomes (Odom et al., 2010). ACT appeared to successfully enhance cognitive defusion and improve emotional eating, bingeing, and grazing, all of which have been implicated in postoperative weight outcomes (Bradley et al., 2016).

In light of several methodological limitations, the study findings of Bradley et al. (2016) and Weineland et al. (2012a; 2012b) provide only tentative evidence of causal effects for the efficacy of ACT for post bariatric surgery individuals. Both studies had small sample sizes which compromises the generalisability of their results. Further, Bradley et al.'s (2016) study lacked a control condition which precluded meaningful conclusions regarding the effectiveness of ACT from being made. Thus, additional research with a control condition and mediation analyses is necessary in order to assess the independent effects of acceptance-based treatment components in the bariatric surgery population.

3.2. Rationale for the Present Research

The increasing prevalence of obesity and its widespread consequences warrant significant attention. Fundamentally, the etiological basis of obesity is characterized by excess energy intake relative to energy expenditure (de Bruijn et al., 2007). While this notion is seemingly simplistic, psychological theories and subsequent research have collectively demonstrated a range of psychological factors implicated in the development and maintenance of obesity, specifically patterns of disordered eating including emotional eating, binge eating, and restrained eating (Stroebe, 2008). Thus, interventions that target these behaviours are necessary to reverse the current rising obesity trends.

Presently, weight-loss surgery is considered the most successful treatment for obesity, with no other treatment leading to such marked and rapid weight reduction (Chang et al., 2014). Notwithstanding its short-term efficacy, weight regain is typical for a substantial portion of individuals within 2 years of surgery (Chang et al., 2014; Ferchak & Meneghini, 2004). Research suggests that poor long-term health outcomes of surgery may be attributable to unresolved disordered eating behaviours that underpin the etiology of obesity (Bocchieri et al., 2002a).

Thus, an investigation of psychological interventions developed to address eating pathology is indicated in attempt to extend the outcomes of weight-loss surgery. Currently, the majority of research has centered on combining surgical weight-loss procedures with behavioural weight control interventions that focus on increasing adherence to dietary guidelines and regular physical activity (Carter & Jansen, 2012; Cooper et al., 2010; Dombrowski et al., 2010; Rudolph & Hilbert, 2013; Teixeria et al., 2015). Though such programs achieve short-term improvements in weight-loss, results are rarely maintained (Lillis & Kendra, 2014; Rudolph & Hilbert, 2013).

Evidence within the eating disorder literature suggests that Acceptance and Commitment Therapy may be effective in enhancing weight-loss surgery outcomes given its principal focus on mitigating experiential avoidance; a concept closely related to disordered eating behavior (ACT; Hayes, 2004). From an ACT perspective, disordered eating patterns are conceptualized as attempts to avoid or relieve unwanted emotional experiences and therefore, facilitating acceptance of such experiences is fundamental to the successful treatment of eating pathology. Recent studies have supported this theory by demonstrating weight related experiential avoidance to mediate disordered eating behaviours in samples of overweight and obese individuals. However, to our knowledge only two studies have investigated the efficacy of ACT in augmenting the effects of weight-loss surgery and no studies have examined this in New Zealand (Bradley et al., 2016; Weineland et al., 2012a).

This research aims to address this limitation by investigating the efficacy of an ACT-based intervention on psychological outcomes and BMI of individuals who have recently undergone weight-loss surgery. The research findings have the potential to enhance the understanding of the general public, health practitioners, and researchers in New Zealand with regard to the psychological mechanisms of obesity. By increasing awareness and understanding, these findings can inform the future design of psychological interventions that meaningfully address these mechanisms and in doing so, facilitate improved health outcomes for individuals who have undergone weight-loss surgery.

3.3. Aims and Research Hypotheses

In response to a request made by the Retreat team, the principal aim of this research was to investigate the efficacy of a five-day Acceptance and Commitment Therapy-based intervention entitled the Foundations of Healthy Living (FOHL) Retreat on wellbeing outcomes of individuals post weight-loss surgery. Specifically, weight-related experiential avoidance, disordered eating behaviours, and BMI were assessed. The secondary aim was to explore these individual's experiences of disordered eating and weight more broadly, both leading up to their decision to have weight-loss surgery and postoperatively. The following hypotheses were preregistered, and findings for each will be reported in the results section. Time since weight-loss surgery was considered to be a potential confounding variable across the first six hypotheses and thus was considered necessary to control for in supplementary analyses. This variable was selected as it is evidenced as being likely to influence factors affecting eating behaviour including hunger, satiety, cravings, and quantity of food consumption, and thus possesses the characteristics of a confounding variable (Al-Najim et al., 2018; Münzberg et al., 2015).

1. We hypothesise that participants who receive the ACT intervention will show larger reductions in weight-related experiential avoidance (as the main target variable of ACT) relative to controls over a three month period. This is based on ACT's key aim to reduce experiential avoidance while weight-related experiential avoidance was chosen specifically given its relevance to the weight-loss surgery population (see section 3.1.4).

2. We hypothesise that participants who receive the ACT intervention will show larger reductions in disordered eating behaviours relative to controls over a three month period. Hypotheses 2, 4, and 5 are based on previous evidence that has shown ACT to be effective in reducing disordered eating behaviours in the weight-loss surgery population (see section 3.1.4.1).

3. We hypothesise that participants who receive the ACT intervention will show larger reductions in uncontrolled eating compared to controls over a three month period.

4. We hypothesise that participants who receive the ACT intervention will show larger reductions in emotional eating relative to controls over a three month period.

5. We hypothesise that participants who receive the ACT intervention will show greater reductions in Body Mass Index (BMI) relative to controls. This hypothesis was based on prior research that has shown ACT produced reductions in BMI in overweight individuals including individuals who have undergone weight-loss surgery (see section 3.1.4).

6. We hypothesise that participants who receive the ACT intervention will show larger increases in flexible dietary restraint compared to controls over a three month period. Hypothesis 3 was developed based on the following points. First, previous research has posited flexible restraint may be related to successful weight management in overweight populations (see section 3.1.2). Second, individuals who have had weight-loss surgery require

a degree of restraint for long term weight management. Third, ACT aims to enhance psychological flexibility and thus, it was expected that the ACT-based intervention would likely increase flexible eating with consideration to its aim of improving long term weight management.

7. We hypothesise that the improvements in disordered eating will be partially mediated by changes (reductions) in experiential avoidance. This is based on ACT's conceptualisation of disordered eating as an attempt to avoid or mitigate emotional discomfort. Thus, it is expected that reducing experiential avoidance will in turn, lead to reductions in disordered eating (see section 3.1.4.1).

8. We hypothesise that the improvements in BMI will be partially mediated by changes (reductions) in experiential avoidance. Based on the positive association between disordered eating and experiential avoidance theorised by ACT, and the positive correlation between disordered eating and BMI in the post weight-loss surgery population, it is expected that positive changes in BMI would be mediated through targeting experiential avoidance (see section 3.1.4.1 for empirical support for this effect).

4. Method

This chapter outlines the research design, data collection, participants, procedures, and ethical considerations used in the present study.

4.1. Study Design

The study used an explanatory sequential mixed method preregistered design to investigate the research questions. This was guided by a postpositivist critical realist approach, which recognises an objective reality and the impossibility of apprehending it. From a critical realist perspective, the fallibility of all measurement warrants the inclusion of methodological triangulation, that is, the use of multiple methods to more clearly understand the research topic. Hence, quantitative and qualitative methods were included to obtain a more comprehensive view of psychological outcomes following weight-loss surgery while the combination of both likely neutralised the limitations of each method alone (Yoshikawa et al., 2013). The study's preregistration document is viewable at https://osf.io/aqyhn?view_only=f32d7a31025b4b77a5d29cef4aabad5c.

A predominantly quantitative orientation was taken to fulfil the primary aim of evaluating the efficacy of the ACT intervention. For the quantitative portion of the study, a quasi-experimental non-equivalent control group design with three time points was used to identify the best predictors of change over time in the measured outcome variables. Both practical and ethical constraints prevented the possibility of random assignment to the treatment. Specifically, the Retreat is available to all weight-loss surgery patients and attendance is self-funded. Furthermore, attendance requires travel to the Retreat's location for a four-night (five day) in-house stay and thus potentially interferes with participants' work, family, or daily commitments. Yet, with acknowledgement to the study's aim of investigating the intervention's impacts within real world conditions, controlling these conditions and removing their influence on treatment effects was not essential to the study. Nevertheless, to increase internal validity of the research and group comparability, inclusion criteria and the time periods in which baseline characteristics were obtained were the same for both groups. The distance between time points also proved helpful in assessing whether the intervention effects were sustained over a significant time period of time (Handley et al., 2018).

Given the somewhat recent inclusion of psychological factors in bariatric surgery research, a qualitative component was included to provide a more complete and detailed understanding of the factors implicated in surgery outcomes. Open-ended questions provided a platform for making further inferences about the causal mechanisms implicated in disordered eating and weight difficulties (McEvoy & Richards, 2006). Thematic analysis of the data also elucidated important facilitators and barriers to weight management after surgery.

4.2. Participants

All 87 participants (24 Retreat participants, 63 controls) were recruited between January 2019 and July 2019 from Weight Loss Surgery Limited (WLS Ltd), a private weight loss surgery clinic operating in both Hamilton and Wellington, New Zealand. One Retreat was held per month which resulted in seven waves of recruitment, as illustrated in Table 2. To determine the target sample size required to achieve adequate power, a statistical power analysis was conducted. Specifically, an *a priori* analysis for repeated measures, within-between interaction ANOVA was conducted using G*Power 3.1; a freely accessible software used to calculate statistical power. As the two analysis methods are closely related and repeated measures ANOVA was used for supplementary analyses, this was the chosen power analysis with conservative inputs to obtain an approximate estimate of power that requires fewer assumptions to specify than MLM. Previous literature has suggested a strong effect of ACT on weight-related experiential avoidance (η_ρ^2 = 0.18; d = .69) (Weineland et al., 2012a; 2012b). Yet, given the risk of publication bias and the aim to be able to detect smaller effects, a more conservative effect size was specified (Sohn, 1996). A target sample size of 74 was calculated for the primary outcome variable of weight-related experiential avoidance given $\alpha = 0.05$, Power = 0.8, correlation among repeated measures = 0.5, and a moderate effect size of $f = 0.15$. While this is a small sample size for MLM, it does not prevent its use or compromise the accuracy of the estimates (regression coefficients and variances) (Hox & McNeish, 2020; Maas & Hox, 2005).

Table 2

Number of Retreat and Control Participants Recruited at Each Wave of Data Collection.

Data collection wave	Retreat participants *n*	Control participants *n*
January 2019	2	0
February 2019	2	0
March 2019	2	1
April 2019	5	4
May 2019	2	19
June 2019	5	27
July 2019	6	12
Total	24	63

Intervention group participants were those attending the FOHL Retreat, a 5-day ACT-based intervention. Participants in the control condition received standard follow-up care from WLS Ltd, which included appointments with the surgical team at 8, 12, and 18 months post-surgery. Table 3 displays the full demographic information of the sample.

4.2.1. Inclusion/Exclusion Criteria

Participants were required to have undergone weight-loss surgery in the form of a gastric bypass, mini gastric bypass, or sleeve gastrectomy between 6 to 18 months prior to their involvement in the research. Following the first two waves of data collection, in an effort to include more participants, this timeline was extended to include all individuals who were up to 2 ½ years post-surgery. For the intervention group, participants were required to be attending the FOHL Retreat for the first time and not have previously participated in the study as a control participant.

The inclusion criteria for control group subjects were: those who had not attended the FOHL Retreat over the data collection period; were not intending to attend a retreat in this time period; nor were they attending any other weight-loss treatment programme, excluding routine follow-up care from WLS Ltd.

Table 3

Participant Demographics (N=87).

Measure	*n*	Total sample %	Retreat %	Control %
Gender				
Female	76	87	4	84
Male	11	13	96	16
Age (years)				
20-29	2	2	-	2
30-39	15	17	17	18
40-49	37	43	50	40
50-59	17	20	29	16
60-69	16	18	4	24
Ethnicity				
New Zealand European (Pākehā)	77	89	96	86
Māori	15	17	21	16
Pacific Islands	2	2	-	3
Other European	3	3	8	2
Other	1	1	-	2

Note. Total percentage for ethnicity does not equal 100 as some participants identified with more than one ethnicity.

Individuals were screened and excluded from study participation for the following reasons:

- Individuals had not undergone weight-loss surgery in the form of a gastric bypass surgery or a laparoscopic sleeve gastrectomy.
- Individuals had previously participated in a FOHL Retreat.
- Individuals had previously participated in the current study.
- Individuals were pregnant at the first measurement point. Females who were pregnant were excluded from participation due to the potential impacts of pregnancy on the measured constructs, particularly eating behaviour and BMI.
- Individuals had participated in any other weight-loss focused intervention over the course of the data collection period. This final exclusion criterion was later revised to account for an online Retreat programme entitled the *PACE Programme* that was released to all WLS Ltd patients in February 2019. Individuals who participated in the PACE programme were not excluded from participating in the study due to the potential for this to exclude participants who had already provided data. A question was added to the third and final survey point that asked all participants whether they had participated in the online PACE Programme. No controls had participated in the Programme.

These criteria were deemed to be appropriate exclusions in order to hold constant confounding variables and their effect on individuals' levels of change across the outcome variables.

4.3. Procedure

In the first instance, potential participants were either self-identified, or initially identified by the Director of WLS Ltd and the FOHL Retreat. Four to give weeks prior to each Retreat, the Retreat Director emailed the researcher a list of unique, non-identifiable numerical IDs that were assigned to individuals upon entry into the Weight Loss Surgery Ltd database of those who were attending the upcoming Retreat, and accompanying surgery dates to ensure that the 6 months to 2.5 years post-surgery inclusion criterion was met. A list of unique, non-identifiable numerical IDs and accompanying surgery dates of potential control participants was also emailed to the researcher. The full process of recruitment and data collection for both the Retreat and control groups is outlined below and illustrated in Figure 3. The Retreat Director approached potential Retreat and control participants on behalf of the researcher by forwarding an email invitation to participate in the study, 14 days prior to each Retreat. The email invitation outlined the study aims, inclusion criteria, information sheet outlining informed consent, in addition to including a link to the study's first survey.

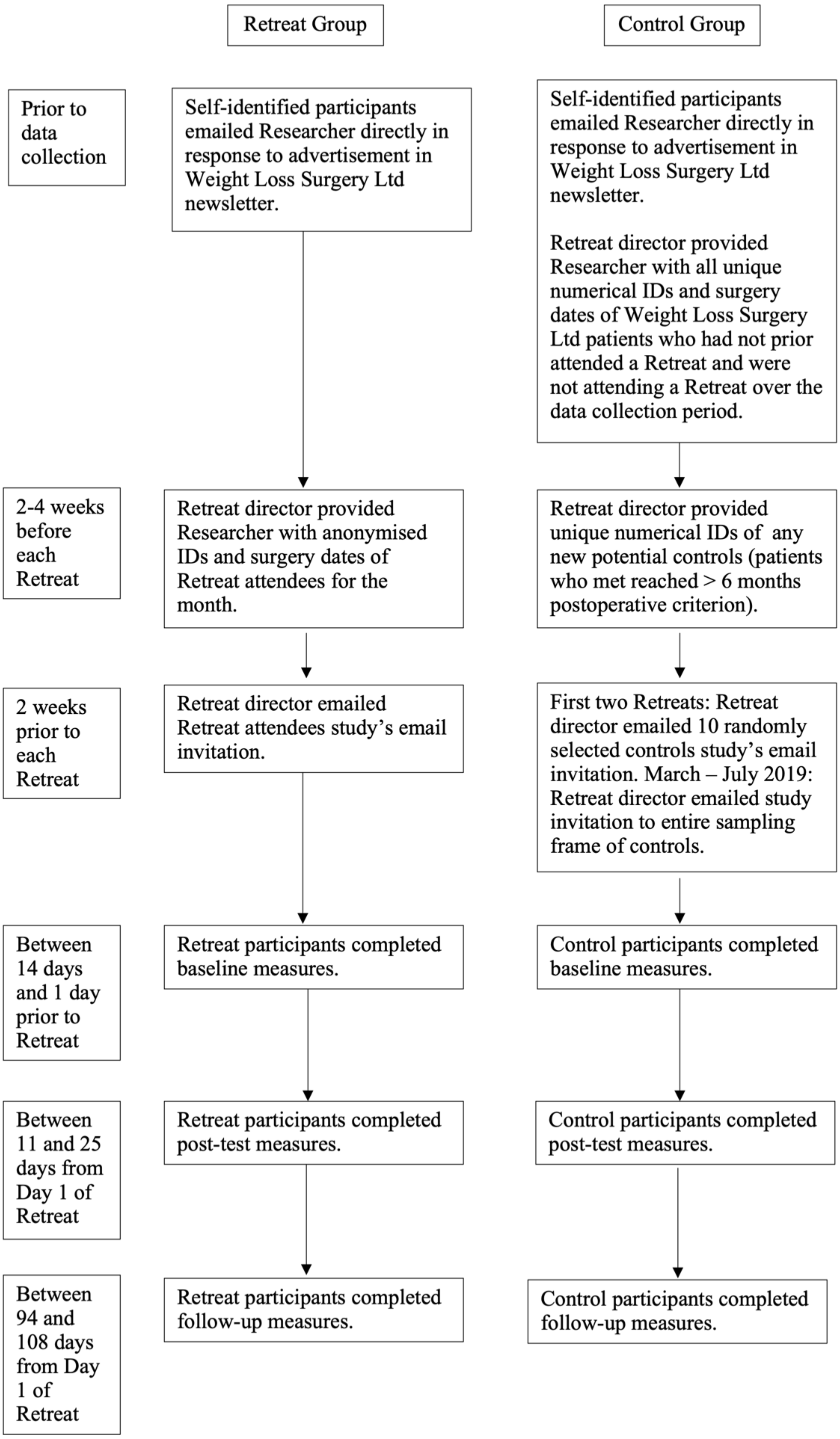
Additionally, self-identified participants expressed their interest by emailing the principal researcher directly, after viewing a research advertisement included in the WLS Ltd monthly email newsletter (see Appendix A). This advertisement provided potential participants with the study's aims, inclusion criteria, participation requirements, and benefits. The primary researcher's contact details were also provided for individuals to express their interest in participating or inquire for further information about the study. Individuals who contacted the researcher to express their interest in participating were asked to provide their written consent, via email, for the researcher to request their non-identifiable numerical ID and surgery date from the Director of WLS Ltd.

Before individuals provided consent to participate, they were informed of the aims, requirements, and their rights as a participant on the study's information sheet (see Appendix B). Once informed consent was provided, participants were directed to the first measurement point (baseline) comprised of the demographics questionnaire, Acceptance and Action Questionnaire for Weight-related Difficulties (AAQW), the Three Factor Eating Questionnaire (TFEQ-R18) (uncontrolled eating and emotional eating subscales), flexible restraint subscale of the original Three Factor Eating Questionnaire, and open-ended qualitative questions. Participants were also asked to provide their height (in centimetres) and weight (in kilograms) measurements which were used by the research team to calculate BMI.

At the end of the first survey, participants were asked to provide their email address to be sent post-intervention and follow-up surveys. Post-intervention measurements were taken one week after the end of the Retreat (11 days from day 1 of the Retreat). Participants were sent a personalised link via the email they provided and asked to complete the AAQW, TFEQ-R18, flexible restraint subscale and provide their weight. A personalised survey link is a URL that uniquely identifies the participant and allows the researcher to track which responses belong to which participants across the repeated measurement time points. Similarly, follow-up measures of the AAQW, TFEQ-R18, flexible restraint subscale and weight were administered 3 months post-intervention via personalised links emailed to participants. This final link also contained an open-ended question for the intervention group to describe how participation in the Retreat impacted upon their relationship with food, eating, and weight.

Figure 3

Flow Diagram of the Recruitment and Data Collection Process for Retreat and Control Groups.



4.3.1. Retreat Group

The majority of potential participants were initially identified by the Director of WLS Ltd. Approximately two to four weeks before each Retreat, the Director emailed the researcher a list of all Retreat attendees (up to 10) for the month using unique numerical IDs that were assigned to patients upon entry into the WLS Ltd database. Surgery dates were also provided to ensure that attendees met the post-surgery timeframe inclusion criterion of 6 months to 2 ½ years.

Intervention participants were initially required to complete the first survey prior to their arrival at the residence where the Retreat is held. However, following limited recruitment success within the first two waves of data collection, the timeframe for baseline measurement was extended by one day. This time extension provided the opportunity for the Retreat director to address the whole group about the study by reading out a script about the research project that was written by the researcher (Appendix C) and participants were able to complete baseline measures on this evening, before the Retreat programme commenced the following morning.

4.3.2. Control Group

For the control group, the Retreat Director referred to the WLS Ltd database to identify individuals who had weight-loss surgery between 6 months to 2 ½ years ago, and had neither attended a Retreat nor registered to participate in a Retreat over the data collection period. Based on this inclusion criteria, the Retreat director emailed the researcher a list of all potential control participants using their unique numerical IDs and dates of surgery. This list served as the sampling frame from which 10 potential controls were randomly selected and approached at the same time as Retreat participants for each wave of data collection, such that both groups completed their surveys within the same time range at all data collection points.

However, due to the large sampling frame and limited recruitment success during the first two months of data collection, this recruitment method was revised in March 2019 with ethical approval, to ensure that all individuals in the sampling frame were approached by random selection over the remaining five waves of data collection. To ensure this sampling frame remained up to date, the Retreat director notified the principal researcher of any new potential controls via email, and the researcher ensured that individuals were excluded from the frame once they no longer met inclusion criteria (as determined by their date of surgery).

4.4. Measures

The following measures were administered to participants online using Qualtrics; a web-based survey tool that was used to build and distribute the surveys at each time point. A reliability analysis was performed on the measures for the three primary variables – weight-related experiential avoidance, disordered eating, and flexible dietary restraint. This was important to ensuring the accuracy and integrity of subsequent results. Table 4 summarises the results of the reliability analysis for each variable at each time point; all coefficients for the Acceptance and Action Questionnaire for Weight-related Difficulties and Three Factor Eating Questionnaire-Revised 18-item version were above .85.

4.4.1. Outcome Measures

4.4.1.1. The Acceptance and Action Questionnaire for Weight-Related Difficulties (AAQW). The AAQW (Lillis & Hayes, 2008) is a 22-item self-report questionnaire that measures experiential avoidance of weight related thoughts and feelings, and the degree to which they interfere with valued actions (see Appendix D). This was chosen over the general measure of experiential avoidance (Acceptance and Action Questionnaire [AAQ]; Hayes et al., 2004) from which the AAQW items were developed, as previous research has found that using a content specific measure of experiential avoidance relevant to the area targeted by the intervention, provides a better assessment of processes of change, particularly in health domains (Lillis & Hayes, 2008; Palmeira et al., 2016).

Table 4

Means and Standard Deviations of Study Variables for the Total Sample at Each Time Point.

Measures	*n*	*M*	*SD*	α	Possible range
AAQW					
Baseline	87	76.75	18.67	.86	22-154
Post-intervention	54	74.26	20.50	.90	22-154
Follow-up	55	71.93	19.08	.88	22-154
TFEQ-R18					
Baseline	87	24.02	7.86	.93	12-48
Post-intervention	54	23.89	7.04	.92	12-48
Follow-up	55	23.35	7.06	.93	12-48
Uncontrolled eating					
Baseline	87	17.45	5.87	.91	9-36
Post-intervention	54	17.20	5.19	.90	9-36
Follow-up	55	17.02	5.08	.91	9-36
Emotional eating					
Baseline	87	6.57	2.46	.86	3-12
Post-intervention	54	6.69	2.26	.84	3-12
Follow-up	55	6.33	2.33	.86	3-12
Flexible Dietary Restraint					
Baseline	87	31.33	5.03	.79	12-48
Post-intervention	54	31.62	4.91	.79	12-48
Follow-up	55	32.79	4.56	.72	12-48

The first 10 items of the AAQW ask respondents to rate how consistent each statement is with their own experiences. These items include "I am not in control of what I eat" and "I need to feel better about how I look in order to live the life I want to." Responses range from 1; never true, to 7; always true. The next 12 items ask subjects to rate how believable each statement is, including “If I’m overweight, I can’t live the life I want to” and “If I gain weight, this means I have failed.” Responses range from 1; not at all believable, to 7; completely believable. Items 1, 6, 7, 14, and 18 are reverse coded, with higher scores indicative of greater levels of experiential avoidance for weight-related concerns. A sum score is calculated across all items with a maximum possible score of 154 and minimum score of 22.

The psychometric properties of the AAQW have been assessed in samples of individuals with obesity (Lillis & Hayes, 2008), and in a bariatric surgery population (Weineland et al., 2013). It has shown good internal consistency (α = .86 - .88) and convergent validity, with moderate to strong correlations with disordered eating attitudes and behaviours (Weineland et al., 2013). Further, sensitivity to change was also found in a sample of overweight and obese women who participated in a 12 session ACT-based programme (Palmeira et al., 2016). Results within a bariatric surgery sample showed that the AAQW predicted poor psychosocial and behavioural outcomes six months post-surgery, providing preliminary support for its use as a measure for postoperative adjustment (Weineland et al., 2013). The measure demonstrated good internal consistency across the overall scale score as displayed in Table 4.

4.4.1.2. The Three Factor Eating Questionnaire, Revised 18-item version (TFEQ-R18). The TFEQ-R18 (Karlsson et al., 2000) is a self-report questionnaire developed to measure the cognitive and behavioural components of eating (see Appendix E). It is a shortened and revised version of the original 51-item TFEQ (Stunkard & Messick, 1985) and was developed on a large sample of obese men and women. It comprises 18 items on a 4-point response scale and evaluates eating behaviour under 3 subscales: Cognitive Restraint, Uncontrolled Eating, and Emotional Eating. The Cognitive Restraint subscale was not used in the present research; only the Uncontrolled Eating and Emotional Eating subscales were included together as ‘disordered eating’ and as separate outcome variables. The decision to exclude the Cognitive Restraint subscale was made based on the uncertainty surrounding the role of cognitive restraint in long-term weight management and prior research that has theorised some forms of restraint (flexible restraint) may be associated with more positive health outcomes than others (rigid restraint) (see sections 2.3.2.3; 2.3.2.4; 3.1.2).

Uncontrolled eating comprises 9 items and assesses difficulties in regulating food intake due to perceived loss of control and subjective feelings of hunger. Items in this subscale include “Sometimes when I start eating, I just can’t seem to stop” and “Do you often go on eating binges though you are not hungry?”. Emotional eating assesses individuals’ tendency to eat in dysphoric mood states with 3 items including, “When I feel lonely, I console myself by eating.” Item responses are scored between 1 and 4 with varying anchors across items. Items are summated into subscale scores. Higher scores in the respective scales are indicative of greater levels of disordered eating.

Regarding the TFEQ’s psychometric properties, Karlsson et al. (2000) reported a three-factor structure with a Cronbach’s $\alpha = .77$ for the cognitive restraint subscale, $\alpha = .83$ for the uncontrolled eating subscale, and $\alpha = .85$ for the emotional eating subscale. Factor analysis using principal components analysis with orthogonal and oblique rotations were conducted. A three-factor structure was imposed on two data sets and cross-validated using subgroup analyses which confirmed the stability and generality of this factor structure. The measure demonstrated good internal consistency across the overall scale scores and separate subscales as shown in Table 4.

4.4.1.3. Flexible Dietary Restraint Subscale. The flexible dietary restraint subscale of the original Three Factor Eating Questionnaire was developed by Westenhoefer (1991) with the aim of increasing understanding of the concept of restraint and its associations with other related variables such as binge eating and BMI. Westenhoefer (1991) divided the original Three Factor Eating Questionnaire (Stunkard & Messick, 1985) into subcomponents; rigid and flexible restraint. Five additional items (items 8 – 12) were later included to the flexible restraint subscale to improve its internal consistency (Westenhoefer et al., 1999). Flexible dietary restraint is now assessed with 12 items (see Appendix F). This scale has been associated with lower BMI and lower frequency of overeating (Elfhag & Rössner, 2005; Westenhoefer et al., 2013). The measure demonstrated good internal consistency as shown in Table 4.

Only the flexible restraint subscale of the original TFEQ (Stunkard & Messick, 1985) was used in the present research for the following reasons: Firstly, in alignment with Fairburn et al.'s (2003) transdiagnostic theory of eating disorders, prior research has found positive associations between counterregulation, weight-gain, and rigid restraint; characterised by an absolute thinking style where foods are frequently avoided and forbidden (Westenhoefer et al., 2013). Alternatively, flexible restraint (no food is 'off-limits' but rather consumed in limited quantities) has been associated with successful long term weight-control, lower BMI in overweight populations, and lower frequency of overeating (Elfhag & Rössner, 2005; Westenhoefer et al., 2013). Second, individuals who have had weight-loss surgery require a degree of restraint for long term weight management. Third, ACT aims to enhance psychological flexibility and thus, it was expected that the ACT-based intervention would likely increase flexible eating with consideration to its aim of improving long term weight management.

Items 1, 2, 3, 4, 5, 8, 9, 10, and 11 were originally in a *true/false* response format with *true* = 1, *false* = 0 however, this was altered to a 4-point response format from *definitely false = 1, mostly false = 2, mostly true = 3, very true = 4* to improve response reliability (Lozano et al., 2008; Simms et al., 2019). Items 6, 7, and 12 are scored using 4-point response formats with varying responses such as *not at all* = 0, *slightly* = 0, *moderately* = 1, *extremely* = 1 for item 6; *unlikely* = 0, *slightly unlikely* = 0 , *moderately likely* = 1, *very likely* = 1 for item 7; *always* = 1, *often* = 1, *rarely* = 0, *never* = 0 for item 12. All items were positively worded and no reverse-coding was required. Total scores range from 12 to 48, with higher scores indicative of higher levels of flexible restraint.

4.4.1.4. Body Mass Index. BMI was as an objective outcome measure of weight change. Participants were asked to self-report their height (in centimetres) and weight (in kilograms) at each measurement point. These values were used to calculate participants' BMI, by dividing a person's self-reported weight by their height squared (kg/m^2).

4.4.2. Qualitative Questions

Qualitative questions were included to augment the psychometric measures by collecting data that extends beyond the specific constructs measured by the aforementioned questionnaires. This study included open-ended questions that inquired more broadly about individuals' experiences of weight and food prior to and following weight-loss surgery. The following questions were presented in the first survey to all Retreat and control participants:

1. How would you describe your journey with food and body image leading up to your decision to have weight-loss surgery?
2. How has your surgery impacted how you feel about yourself and food?
3. Are there any barriers that continue to prevent you from fulfilling your health-related goals?

In addition to these three questions, all Retreat participants were asked the following question at the third and final measurement point:

1. How has your participation in the Foundations of Healthy Living Retreat affected your psychological wellbeing?

4.4.3. PACE Programme Questions

Once the research team were notified of the PACE Programme's release, the survey was amended to include three additional questions administered to all participants that inquired about their involvement in the PACE Programme. These questions were included in the second and third surveys for those who had already completed the first survey. Collecting this data provided the ability to statistically control for PACE Programme usage when analysing the efficacy of the face-to-face ACT-based intervention. The final question focused on the PACE Programme's impact on participants' psychological wellbeing which provided additional valuable information pertaining to the overarching aim of the research. The three additional questions were:

1. Have you used the *PACE Programme?* The PACE Programme is an online programme developed by Weight Loss Surgery Limited to support ongoing success post weight-loss surgery. (Yes/No)
2. If you selected yes, please select all the PACE Programme online modules that you have completed at present: (participants select Modules 1 to 7).
3. How has your participation in the online PACE Programme affected your psychological wellbeing? (open-text box response).

4.5. The Foundations of Healthy Living Retreat

The Foundations of Healthy Living Retreat (FOHL) was developed in 2015 primarily by a clinical psychologist with expertise in ACT with additional input from the Director of Weight Loss Surgery Limited (WLS Ltd) and the main bariatric surgeon of WLS Ltd. Information about the Retreat's model and core principles can be found via the following link: http://www.weightlosssurgery.nz/retreats. It aims to support individuals with long term weight management through promoting mindful, values-based living. It is a 4-day intensive residential programme held approximately once a month for a maximum of 10 participants.

The FOHL Retreat targets the six core components of ACT (acceptance, present moment awareness, self-as-context, defusion, values, and committed action) with reference to the long-term wellbeing goals of individuals post weight-loss surgery. It is an interactive, experiential programme designed to maximise individuals' wellbeing by targeting the psychological mechanisms of lasting behaviour change (The Foundations of Healthy Living Retreat, 2019). This involves increasing self-awareness of the relationship between thoughts, feelings, and behaviour and addressing factors that complicate successful weight management. Hence, it is especially suited to individuals who have had weight-loss surgery but open to all persons interested in weight-loss or weight management.

Twenty-four modules are delivered over the 4 days. Day 1 sets the agenda for the Retreat, and comprises 6 modules focused upon personal values identification, goal setting, mindful eating, experiential avoidance, understanding negative core beliefs, and cognitive defusion techniques. Day 2 consists of seven modules intended to strengthen the prior day's learnings. Modules aim to enhance overall self-awareness of thoughts, feelings, and behaviours, and their connection to each other. Participants are encouraged to consider these internal processes and actions in the context of their personal values. Emphasis is also given to the role of emotions and their influence on behaviour with the aim of enhancing participants' understanding of their own emotional triggers. Practices that promote increased present-moment awareness are taught and include meditation, breathing, cognitive defusion skills and emotional exercises with the aim of providing participants with more adaptive alternatives to their current coping behaviours.

Day 3 involves psychoeducation of the processes that maintain problematic eating behaviours including experiential avoidance and dietary restraint. The concept of 'urge surfing' is also introduced and involves teaching individuals to observe their eating-related urges without attempting to escape or change them. Day 4 of the Retreat focuses on enhancing self-compassion, acceptance, and ongoing awareness of one's emotional experiences as to encourage psychological flexibility. Modules also address willingness to engage in and commit to values-driven behaviours to sustain long-term wellbeing.

Sessions are delivered to groups of up to 10 participants in a workshop-style format comprised of presentations and related activities that facilitate group discussions and personal reflections. This provides an opportunity for collective learning of how to implement new strategies for positive behaviour change whilst encouraging connection between participants with shared difficulties and potentially similar experiences.

The Retreat has a team of five facilitators including two of its developers, that is, the Director of Weight Loss Surgery Ltd and Foundations of Healthy Living Retreats (registered nurse and bariatric consultant) and a laparoscopic abdominal surgeon of Weight Loss Surgery Ltd. Additional facilitators include a registered nurse with expertise in bariatric surgery, a mindset coach and a weight-loss surgery spokesperson with personal experience of weight-loss surgery. A mindset coach refers to a professional who works with an individual to strengthen alignment between their mindset and personal goals through targeting beliefs, thinking patterns, behaviours and habits. Facilitators do not possess formal qualifications in ACT, yet all facilitators received training from the Retreat developers in order to obtain understanding of the ACT framework and ensure the intervention materials were delivered in a consistent manner. The principal researcher was not a Retreat facilitator at any point prior to, or during the study. Prior to data collection, the principal researcher observed the FOHL Retreat, in order to further understand its foci, content, and associated processes. This helped to inform the selection of outcome measures and qualitative questions for data collection.

4.6. The PACE Programme

The PACE Programme (Practicing Awareness through Self-compassion and Education) is an online, condensed version of the FOHL Retreat developed by two Retreat facilitators. While the aim of the study was not to evaluate the PACE Programme, it was made freely available to all patients registered with Weight Loss Surgery Ltd from August 1st, 2018, and purchasable for those registered prior to this date, some of whom were participants in the present study. The Retreat director informed the research team of this four days prior to the programme being released.

The programme was designed to improve patient accessibility to the support and teachings that the Retreat offers in order to increase long-term behavior changes required for sustainable success post weight-loss surgery (PACE Programme, 2019). The interactive programme comprises 7 content modules of the same learnings, demonstrations, tools and reflective exercises as in the Retreat. All sessions are delivered by the FOHL facilitators and filmed at the Retreat. Resources include both documented Retreat sessions with participants in addition to facilitator interactive videos produced specifically for the online programme. Once subscribed, individuals have unlimited access to the programme content and resources. Individuals may communicate with programme facilitators in the comments section of each module. Access to support from Weight Loss Surgery coaches (individuals who have lived experience of weight-loss surgery and supporting patients through this process) is also provided. Lastly, reinforcement of learnings is encouraged through the incorporation of written reflections throughout the programme.

Module 1 is structured similarly to Day 1 of the Retreat with a focus on core values identification, self-sabotage, and practical skills for mindful eating and positive habit development (PACE Programme, 2019). Module 2 extends upon the learnings of Module 1 with regards to the significance of values prioritization and increasing awareness of how negative self-talk interferes with goal pursuit. Understanding the function of emotional eating as a form of experiential avoidance is also a focus with the aim of increasing recognition of the futility of avoidant behaviours. Module 3 requires participants to reflect on the presence of their values in their daily lives. This is intended to foster self-awareness and support individuals to identify values they would like to further attend to. Modules 1 to 3 also include mindfulness activities with the aim of increasing contact with the present moment.

Module 4 highlights the significance of behaviour change for ongoing success post-surgery. This includes practicing regular self-care and integrating new emotional coping strategies into one's behavioural system. Across Module 4, 5, and 6, sessions focus on building awareness of the fusion between feelings, thoughts, and behaviours and learning with the aim of promoting cognitive defusion. Emotional management techniques that are taught as alternatives to avoidance include urge surfing, distraction, productive communication strategies, and acceptance. Module 7 comprises several activities that reinforce the key learnings from the programme and encourage individuals to practice self-as-context, acceptance, present moment awareness and cognitive defusion. In addition to these modules, physical activity exercises are also provided.

4.7. Ethical Considerations

The current study complied with the Massey University Code of Ethical Conduct for Research, Teaching, and Evaluations involving Human Participants (Revised Code; Massey University, 2017). Full ethical approval was applied for in August 2018 and given on October 17th 2018 by the Massey University Health Ethics Committee: Southern A. Additional Health and Disability Ethics Committee (HDEC) approval was not required as the research was determined to be a minimal risk observational study and thus out of scope for review (Health and Disability Ethics Committee, 2018).

Minimisation of risk of harm and respect for persons was established by providing a clear explanation of the research to participants prior to their voluntary consent, including the research aims and the use, storage, and sharing of data. Participant rights were outlined on the information sheet and the contact details of the research team were provided to address any participant queries about the research. Consideration was given to the possibility that some participants may have experienced minor discomfort whilst responding to questionnaire items or recounting their journey with weight and eating difficulties. To address this, participants were provided with a list of support services at the end of each survey that they could contact if they felt distressed. Further, participants were made aware of their right to ignore any questions they felt uncomfortable answering. Participation in this research was voluntary, and individuals could withdraw from the study up until submission of the third and final data point. The service from which participants were recruited (WLS Ltd) was not informed of their participation in the research and did not have access to any of the data collected. No deception was used in this study.

Confidentiality was assured, and all identifiable data was only accessed by the research team. All data was stored securely on a password-protected folder, on a password-protected computer of the researcher until the project was completed, after which the identifiable data was destroyed. To preserve the data for future use, a de-identified copy of the dataset was posted on an open-access online repository. Any information that could identify participants, including demographic variables, was removed before the dataset was shared. A copy of the demographic variables was stored in a password-protected online repository that only the researcher has access to.

To avoid any conflict of interest between the research team and WLS Ltd (as the owners of the FOHL Retreat and the service from which participants were recruited from), a Memorandum of Understanding between WLS Ltd and the researcher was developed and signed by both parties. This indicated that the scholarship provided by WLS Ltd to support the researcher would not compromise the research adequacy, ethical acceptability or the freedom of the researcher to publish the research findings. The responsibilities of the researcher and WLS Ltd were also clearly outlined in the Memorandum of Understanding. This stated that the researcher was responsible for the background research that informed the research aims and hypotheses, development of the methodology, data collection, and all final decisions on the thesis produced. The director of WLS Ltd was responsible for identifying and facilitating recruitment of participants for the Retreat and control groups in accordance with the recruitment process developed by the researcher and illustrated in Figure 2.

4.7.1. Māori and Cultural Responsiveness

Though this study took a mainstream research approach, and did not specifically focus on Māori, it was designed to include a range of participants from the general population of New Zealand, which includes Māori. The principle of protection outlined in the Treaty of Waitangi was incorporated into the development and application of this study (Health Research Council of New Zealand [HRCNZ], 2010). The researcher consulted with a Māori clinician from the School of Psychology with expertise in bicultural psychology regarding the ethical dimensions of the project with consideration to its potential impact on Māori.

In regard to the principle of participation, this study was inclusive of all individuals who were eligible and willing to participate and did not discriminate with regards to ethnicity or culture. To encourage the involvement of Māori as research participants and promote inclusivity, the research information sheet contained Te Reo. Implied consent prior to survey completion was obtained, and all participants were aware of their right to leave questions unanswered and withdraw from the study up until the final data collection point.

4.8. Data Management

4.8.1. Assumption Checks

The assumptions of normality, linearity of relationships, and homogeneity of variance of error terms were checked using exploratory analyses using the plot() function in R (see

Appendix G). Normal distribution of the residual plots was checked via visual inspection. Visual inspection of the normal probability plots for weight-related experiential avoidance, uncontrolled eating, emotional eating and flexible restraint followed a diagonal straight-line indicative of normal distribution. Scatterplots of the standardised residuals against the standardised fitted values were visually inspected to check whether the residuals were rectangular thus indicating linearity. The scatterplots showed no fitted pattern, indicating no major violations of linearity and thus a linear relationship between predictors and outcome variables could be assumed. Regressions additionally assume the homogeneity of residual variances, meaning that the residuals are assumed to have constant variance for all values of the predictor variables (homoscedasticity). Homoscedasticity was assessed with the inspection of whether the residuals in the scatterplots were distributed at equal widths across the graphs. The substantive analyses were not re-specified based on these results.

4.8.2. Coding Time

The correct measurement of time is important for longitudinal research data to ensure that it accurately reflects the spacing between data collection time points for the sample. Given that there were multiple waves of data collection and multiple time points of unequal spacing in the present study, time was treated as a continuous variable for the primary analyses (multilevel models) and coded as the number of days elapsed since the first day of the applicable Retreat programme for each participant. This allowed for group comparison of patterns of change over the full three-month time period and held practical relevance given practices introduced by the Retreat were likely implemented over time and thus impacted the dependent variables in a gradual manner. As individuals completed the first data collection point within a two-week timeframe, this first time point was coded as a negative value ranging from -14 to -1 to reflect each individual's own participation points. A two-week timeframe was also given to complete post-intervention and follow-up surveys hence, post-intervention and follow-up data points were coded between 11 to 25, and 94 to 108 respectively. Table 5 exemplifies the coding of time for each group across each measurement point.

Table 5

Coding of Data Collection Time Points by Group.

Data collection time points	Coding individual time points
Baseline	- 14 to - 1 (number of days from individual survey completion to Day 1 of Retreat)
Post-intervention	11 to 25 (number of days elapsed since Retreat)
Follow-up	94 to 108 (number of days elapsed since Retreat)

4.9. Quantitative Data Analysis

Data was analysed using R, a free software language for statistical computing and data science (R Core Team, 2019). The pre-registration, deidentified copy of the dataset, R script, and survey are available online at https://osf.io/nuwjb/?view_only=a8c7950fcc2a4196acaea8b7c325c0a5. For the primary hypotheses (Hypothesis 1 to 6), multilevel modelling (MLM) was used to model change over time in the relevant outcome variables which included weight-related experiential avoidance, flexible restraint, emotional eating, uncontrolled eating, and body mass index (BMI). The main focus was on the interaction of time and group to ascertain whether participants in the intervention group improved more or less on the various dependent variables than in the control group.

4.9.1. Missing Data

Choosing an appropriate approach to manage missing data is integral to ensuring unbiased estimates and robust statistical power. The management of missing data was specified prior to analysis in the study's preregistration. Where an entire survey was completely missing for a participant at a given time point, the data point was excluded from analysis although other completed surveys remained. Returned surveys that did not contain any data on any of the study's dependent variables (DVs) were treated as missing and excluded from analysis. Of the total sample, 51% (*n* = 44) provided data at all three time points. Sixty-three percent of Retreat group participants (*n* = 15) and 46% of control group participants (*n* = 29) provided data at all three time points. Table 6 displays the number and percentages of completed surveys at each time point.

Table 6

Total Number of Surveys Completed at each Measurement Point by Group.

Measurement point	Total sample *n* (%)	Retreat group *n* (%)	Control group *n* (%)
Baseline	87 (100%)	24 (100%)	63 (100%)
Post-intervention	54 (62%)	17 (71%)	37 (59%)
Follow-up	55 (63%)	17 (71%)	38 (60%)

One of the notable advantages of multilevel models are their flexibility in handling missing data as they can provide restricted maximum likelihood estimates based on all the data that was available without completely excluding participants that had some missing time points. It also allows the use of unbalanced data, such that uneven time points across participants can be included. Thus, those who provided at least two time points (*n* = 65) were included in the multilevel models. However, as required for repeated measures ANOVA, only those who provided three data points (*n* = 44) were included in the analyses.

As preregistered, missing item responses within submitted surveys were imputed using expectation maximisation (EM) imputation. Just 1.25% of possible responses to the DV items used in this study across all time points were missing (for returned surveys). The amount of missing data for each questionnaire across all time points was 0.84% for the

AAQW, 1.53% for the TFEQ, and 1.74% for the FC. An overview of missing data including the quantity of missing questionnaire items of submitted surveys are reported in Table 7.

Table 7

Overview of the Amount of Missing Data in the Final Data Set at each Time Point.

Measure	Number of missing items	Total number of items	% Missing data
All variables			
Baseline	101	4002	2.5%
Post-intervention	11	2484	0.44%
Follow-up	1	2530	0.04%
AAQW			
Baseline	26	1914	1.36%
Post-intervention	10	1188	0.84%
Follow-up	0	1210	0.00%
TFEQ-R18			
Baseline	36	1044	3.45%
Post-intervention	0	648	0.00%
Follow-up	0	660	0.00%
Flexible Dietary Restraint			
Baseline	39	1044	3.74%
Post-intervention	1	648	0.15%
Follow-up	1	660	0.15%
BMI	Number of missing BMI values		
Baseline	10	1	-
Post-intervention	7	1	-
Follow-up	0	1	-

The EM imputation approach to dealing with missing data is recommended in multivariate analyses as it minimises the potential for biased estimates and is more efficient than case deletion which would substantially reduce the overall sample size in cases where only small amounts of data are missing (Schlomer et al., 2010). Furthermore, EM preserves the variance and is appropriate for longitudinal studies with data point non-response (as was present in this study), as it utilises information from across all time points (Schafer & Graham, 2002). EM imputation utilises the expectation-maximisation algorithm to predict the values of missing data points for a case based on the values of variables for which observations are present for that case. The validity of utilising EM imputation to handle missing data depends on the nature of the data as it assumes the data are either "missing completely at random" (MCAR) or "missing at random" (MAR) that is, the missing data is due to reasons unrelated to the unobserved data. Thus, a test of the nature of the missing data was also performed by Little's MCAR test. No evidence to reject a null hypothesis that the data was MCAR was found ($p > .05$) and thus suggested EM imputation was an appropriate approach to remedy missing data. The EM imputation procedure included all of the DVs to maximise the accuracy of the imputations. For the purposes of all further analyses in this thesis, imputed values have been substituted for missing items on the DVs and analyses are performed using the complete version of the dataset.

4.9.2. Multilevel Modelling

MLM was chosen as the primary statistical analysis method based on several of its advantages. First, it can be used to estimate change over time which is essential in testing the primary research hypotheses. Second, multilevel models are able to manage models with varying time points as in the current study where different participants were sampled at different time points (Gelman & Hill, 2007). Third, unlike Ordinary Least Squares (OLS) regression, MLM does not assume independent observations which is appropriate given the within-person repeated-measures study design. Fourth, MLM is able to manage missing observations and thus, participants who did not complete all three surveys were not excluded from the study as repeated-measures ANOVA would otherwise require. The latter two features do not apply to repeated-measures (RM) ANOVA and thus make MLM advantageous over RM ANOVA, especially in longitudinal observational studies (Gelman & Hill, 2007). MLM also models patterns of change at the individual level and thus accounts for each participant's individual change trajectory across the outcome variables (Gelman & Hill, 2007).

An additional benefit of MLM to the present research is that it can provide an indirect control for regression to the mean by permitting the intercepts and slopes to covary and thus accounts for heterogeneity in individual growth trajectories (Gelman & Hill, 2007). This is particularly relevant given the possibility that participants from the intervention group had lower/higher baseline scores on the outcome variables relative to the control group.

Hypotheses 1 to 6 were tested primarily by specifying a multilevel model with the AAQW, TFEQ-R18, Uncontrolled eating, Emotional eating, flexible dietary restraint scores and BMI as the dependent variables, respectively. Time, group, and time and group interaction were the independent variables for each hypothesis. The intercept and the effect of time were random across participants; all other effects were fixed. The time and intercept parameters were permitted to covary to provide more accurate estimates of the slopes and intercepts. All effects were assumed to be linear while assumption tests indicated no major violations of linearity for any of the dependent variables. The variables for each multilevel model are outlined in Table 8.

Table 8

Variables for Multilevel Models testing Primary Research Hypotheses.

Hypotheses	Dependent Variable
Hypothesis 1	AAQW scores
Hypothesis 2	TFEQ-R18 emotional eating and uncontrolled eating scores
Hypothesis 3	TFEQ-R18 Uncontrolled eating subscale scores
Hypothesis 4	TFEQ-R18 Emotional eating subscale scores
Hypothesis 5	TFEQ Flexible restraint subscale scores
Hypothesis 6	BMI values

Note. Independent variables for each hypothesis were as follows: Time since day 1 of Retreat, group, time*group, and time since weight-loss surgery.

4.9.3. Repeated-measures Analysis of Variance (RM ANOVA)

A repeated measures analysis of variance (ANOVA) including effects for time (as a nominal variable indicating the wave of data collection), group, and time*group was included as a sensitivity analysis to assess the robustness of the multilevel models. While MLM has several salient advantages that justify its use as the primarily analysis method (as discussed in section 4.9.2), RM ANOVA has the advantage of not assuming a linear effect of time.

4.9.4. Mediation

The present research examined whether ACT produced change in disordered eating behaviour and BMI in the theoretically expected way, that is, through targeting experiential avoidance. Two mediational analyses were performed using the R package “mediation”, to assess whether pre to follow-up changes in disordered eating and BMI were mediated by pre to follow-up changes in experiential avoidance as hypothesised (Hypothesis 7 and 8). Mediating effects were tested by estimating the direct and indirect effects. The indirect effect refers to the effect of the ACT-based intervention on eating behaviour and BMI through its effect on weight-related experiential avoidance. The direct effect refers to the effect of the intervention on eating behaviour and BMI when holding weight-related experiential avoidance constant. Mediation was assessed using a cross-product test in which the significance of the cross product of the coefficients for the intervention group to mediator relation (path a), and the mediator to outcome relation controlling for the intervention (path b) was examined. A non-parametric multivariate extension of the cross-product test was used and included bootstrapping with 1000 simulations, where the cross-product test was calculated on each bootstrapped sample. The mediation models for hypotheses 7 and 8 are represented below, by Figure 4 and 5, respectively.

Figure 4

Mediation Analyses with the FOHL Retreat as the Predictor Variable, Disordered Eating Behaviour as the Outcome Variable and Weight-related Experiential Avoidance as the Mediator Variable.

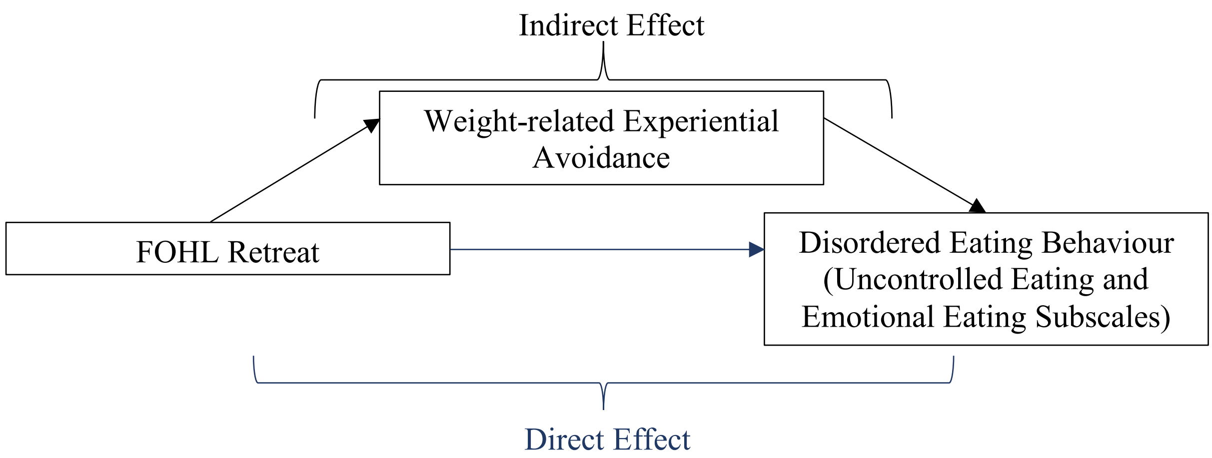
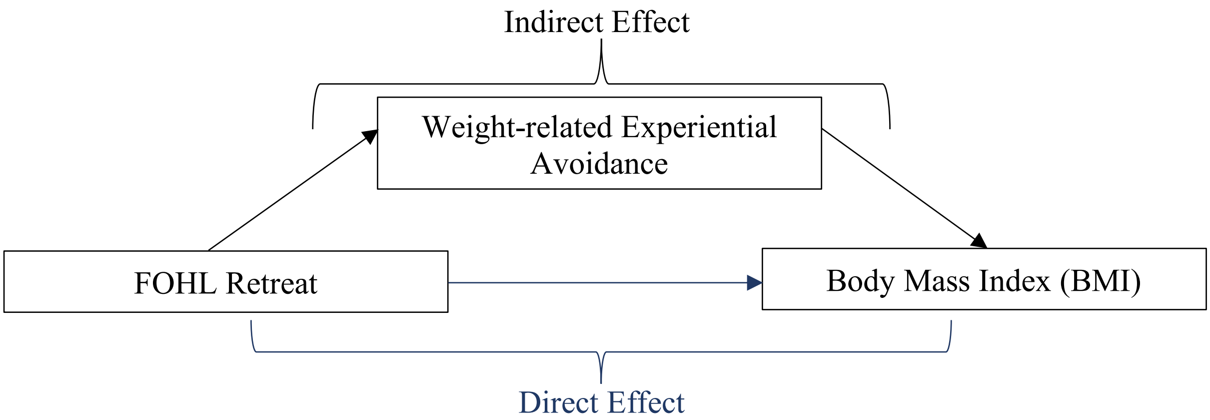


Figure 5

Mediation Analyses with the FOHL Retreat as the Predictor Variable, Body Mass Index as the Outcome Variable and Weight-related Experiential Avoidance as the Mediator Variable.



5. Quantitative Results

This chapter presents the main results from the multilevel analyses and sensitivity analyses. Prior to answering the research hypotheses and specifying the multilevel models, preliminary analyses are presented. First, the chapter begins by providing an overview of the final sample characteristics including sample size and demographic variables. Next, the results from the reliability analyses performed on the study's main variables (AAQW, TFEQ-R18, Flexible Dietary Restraint subscale) are presented. Consideration is also given to missing data within the current research. Preliminary correlation analyses on the main variables were presented to highlight which variables appeared to be related. Assumption checks were also performed for linearity, normality, and homoscedasticity for each of the multilevel models.

The coefficients of the multilevel models are presented for each hypothesis (Hypothesis 1 to 6). The Retreat and control groups' change over time in the primary variables are presented in graphs for comparison. Sensitivity analyses were performed to assess the potential impact of time since weight-loss surgery on the main interaction effect between Group and time on the DVs in each multilevel model. Following the multilevel models, a second sensitivity analysis was performed for each hypothesis in the form of a mixed between-within subjects analysis of variance (ANOVA). This was used to examine the robustness of the results of the multilevel models to an alternative yet reasonable analysis method. Post-hoc analyses were performed for the ANOVAs in which significant interactions between Group and time (as a nominal variable) were found. Each participant's data was also graphed over time in the form of empirical growth plots with an OLS regression line fitted over the top for each participant's scores on the outcome variables, displaying the change that occurred on an individual level (see Appendix H).

5.1. Descriptive Statistics

At the beginning of the study, the average time since weight-loss surgery was 15.6 months (*SD* = 6.78) with a range between 6 and 30 months (2.5 years). The average time since weight-loss surgery at baseline for the Retreat group was 12.4 months (*SD* = 5.5) with a range of 6 and 26 months (2.2 years) and 15.6 months (*SD* = 7.1) with a range of 7 and 30 months (2.5 years) for the control group. An independent-samples t-test was conducted to compare these averages across groups; no significant differences were found $t(43) = 1.90$, $p = 0.06$. The average time since weight-loss surgery was 15 months at post-intervention (*SD* = 7.1), and 17.7 months at follow-up (*SD* = 7). Roux-en-Y Gastric Bypass surgery was the most common type of surgery undergone by 76% ($n = 66$) of participants in the study. A Gastric Sleeve (Laporoscopic Sleeve Gastrectomy) was the second most common surgery type undergone by 16% of participants while the remaining 8% had a Loop (Mini) Gastric Bypass surgery.

5.1.1. Correlations

Correlations were performed between weight-related experiential avoidance, disordered eating, flexibly dietary restraint, and BMI using Pearson's correlation coefficient (2-tailed) on the full dataset for descriptive purposes. This dataset included all participants, including those who only provided one data point, unlike the dataset used for the multilevel models which excludes participants with only one data point (rendering it impossible to calculate change over time). The bivariate correlations for baseline measurements are displayed in Table 9. Post-intervention and follow-up bivariate correlations can be viewed in Appendix I.

Table 9

Correlations of Raw Scores at Baseline Between AAQW, TFEQ, Uncontrolled Eating Subscale, Emotional Eating Subscale, Flexible Dietary Restraint, and BMI.

Variable	1	2	3	4	5	6
1. AAQW	-	$.77^{***}$	$.74^{***}$	$.73^{***}$	.41	-.06
2. TFEQ	$.65^{***}$	-	$.99^{***}$	$.92^{***}$	.39	-.17
3. Uncontrolled eating subscale	$.63^{***}$	$.97^{***}$	-	$.84^{***}$	$.43^{*}$	-.19
4. Emotional eating subscale	$.55^{***}$	$.82^{***}$	$.65^{***}$	-	.24	-.10
5. BMI	$.27^{*}$	.21	.20	.19	-	-.35
6. Flexible dietary restraint	-.17	$-.40^{*}$	$-.40^{**}$	$-.29^{*}$	-.16	-

Notes. *** $p < .001$ (two-tailed); $^{**}p < .01$; $^{*}p < .05$ significance level (2-tailed; Pearson correlation). Correlations for Retreat group are above the main diagonal line (top right) and control group are below (bottom left).

5.2. Assumption Checks

In the fitting of multilevel models for change, it was important to test three primary assumptions for linearity of relationships, normality, and homoscedasticity of error terms (Tabachnick & Fidell, 2007). Testing these assumptions via visual inspection of the residual distributions is recommended (Gujarati, 2006) and thus density plots, Normal Probability Plots, scatterplots, and scale-location plots were inspected using the plot() function in R. The results from such analyses are presented in Appendix G. The Shapiro-Wilk test of normality was also used to investigate the assumption of normality as it was appropriate for the small sample size (Guo, 2012). The residuals of the following dependent variables were found to be approximately normally distributed including the AAQW (W = 0.99, p = .54), TFEQ-R18 (W = 0.99, p = .44), Uncontrolled eating subscale (W = 0.99, p = .28), and Emotional eating subscale (W = 0.99, p = .48). For BMI (W = 0.97, p < .001), and Flexible dietary restraint (W

= .98, p = .004) there was evidence to reject a null hypothesis of a normal distribution. Violation of the normality assumption may increase the potential for false positive results however, simulation studies using a range of non-normal distributions have shown that the false positive rate is not particularly sensitive to violation of this assumption (McDonald, 2014). To further test this assumption, density plots for the residuals for each model fitted with a normal distribution curve were inspected and confirmed that the residuals for all of the DVs appeared to be approximately normally distributed. The Normal Probability Plots were also inspected to see if they followed a roughly diagonal straight line, which indicates an approximately normal distribution. Scatterplots of the standardised predicted values against the standardised residuals for each model were also checked for linearity and homoscedasticity (Field, 2017). Scatterplots were inspected to determine whether the residuals were roughly rectangular which would suggest the relationship between the IVs and DV in each model was linear. The scatterplots were inspected to check whether the residuals were roughly scattered at equal widths across the graph which would suggest homoscedasticity. To further assess for homoscedasticity, a scale-location plot for each DV is displayed in Appendix G. This plot shows whether the residuals are spread equally along the predictor range. A horizontal line with randomly spread points on the plot would indicate homoscedasticity. If the line increases, the residuals for those predictor values are more spread out. For the model predicting the AAQW, a scale-location plot of the residuals indicates non-uniform variance in the low to middle of the AAQW range which indicates greater spread of the residuals at lower to middle AAQW values. The data has more uniform variance at the higher end of the predictor range (between values of approximately 85 to 100). The scale-location plots for the TFEQ-R18 and BMI both indicate uniform variance in the middle and higher values of the predictor range but are somewhat heteroscedastic at the lower predictor range and between predictor values of 30 – 35. Both scale-location plots for

Uncontrolled eating and Flexible dietary restraint appeared heteroscedastic, while Emotional eating indicated uniform variance across the entire range of predictor values. To further assess the homoscedasticity assumption, an ANOVA of the between subjects squared residuals was performed for each DV. All p-values were lower than .05 which further suggests the residuals for all of the DVs were heteroscedastic. This may reflect measurement error changes over time and suggests that REML estimation may not be the most optimal method of parameter estimation however, unbiased estimates of parameters are still produced when homogeneity of variance cannot be assumed (Field, 2013). Nevertheless, as outlined in the preregistration document, substantive analyses were reported irrespective of the assumption check results.

5.3. Multilevel Models

In order to draw statistical inference about the effect of the Retreat (intervention) on the study's main variables, multilevel models were used to test Hypotheses 1 to 6. Participants who provided more than one time point were included in the models which resulted in a sample size of 65 for Hypothesis 1, 2, 3, 4, and 6 comprised of 19 Retreat participants and 46 controls. For Hypothesis 5, 62 participants provided their BMI at more than one measurement point and thus the dataset for this multilevel model included 17 Retreat participants and 45 controls. A key independent variable was *time,* which was measured as the time period elapsed between the date of data collection for a particular individual at a given wave and the first day of the FOHL Retreat for the corresponding month in which they were recruited into the study. In order to make the time coefficients in each model clearly interpretable, time in days was converted to time in months by dividing the former by 30.42 that is, the average number of days in a month of a regular year. The aim was to determine if the rate of change in the DV scores outlined in each hypothesis differed for retreat participants than for controls. An interaction was specified between group and rate of change. The rate of change and intercept (DV level at baseline) were permitted to vary randomly across participants. These parameters were also allowed to covary, such that the rate of change could differ across different starting levels of the DVs.

In addition to the effect of group and time, it is possible that varying dates of surgery from 6 months to 2.5 years across participants could have confounded the effects of the Retreat, as the impact of surgery on eating behaviour and weight-loss are likely to be greatest immediately following surgery and may decrease over time. To manage this potential confound, a supplementary analysis controlling for months since surgery of each observation as a numerical variable was conducted for each hypothesis.

5.4. Sensitivity Analyses

A sensitivity analysis for each of the main hypotheses was conducted using a two-way mixed ANOVA with time as the within-subjects repeated measure (coded as a nominal variable with three points representing baseline, post-intervention, and follow-up), group as the between-subjects factor with two levels (Retreat, control), and the interaction between time and group. This was used to examine the robustness of the results of the six main multilevel models to an alternative model specification. Post-hoc analyses were performed for the ANOVAs in which significant interactions between Group and time (as a nominal variable) were found. Only subjects who provided all three data points were included in these analyses ($N = 44$), and therefore the sample size reduced by 32% from the multilevel model dataset ($N = 65$).

An important consideration when comparing the results of a mixed model with those of a mixed ANOVA is that the former examines linear change, while ANOVA depicts *any* change and thus, the two are not directly comparable. A significant interaction in an ANOVA does not infer significant change over the entire measurement period in the outcome variable as is the case in the mixed model. Thus, post-hoc analyses are required to further understand the nature of the interaction and in particular, the baseline to follow-up comparison was examined to determine whether participants in each group improved over time in the relevant outcome variables.

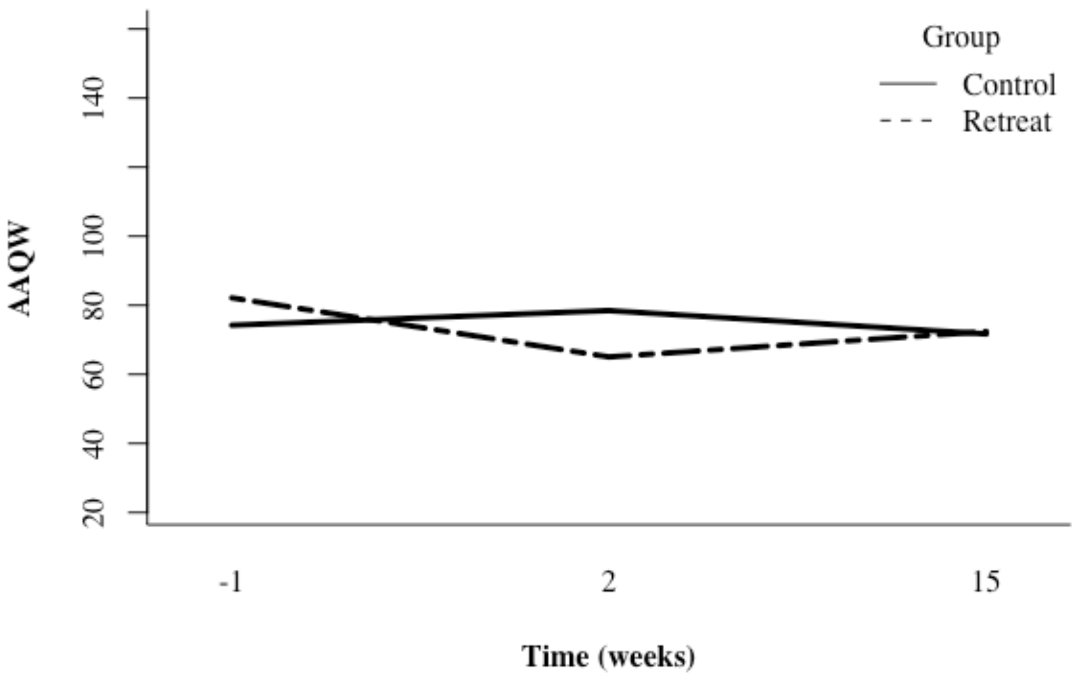
5.5. Hypothesis 1: Weight-Related Experiential Avoidance

5.5.1. Hypothesis 1: Multilevel Models

At the beginning of the intervention, Retreat group participants had a mean score of 82.16 on the AAQW (*SD* = 20.34) improving to a mean of 72.41 (*SD* = 16.96) at follow-up. In contrast, control participants started with lower levels of weight-related experiential avoidance (*M* = 74.23, *SD* = 20.17) and showed only a slight reduction at follow-up (*M* = 71.71, *SD* = 20.17). Figure 6 provides a simple illustration of how participants in the Retreat and control groups, respectively, changed over the measurement period.

Figure 6

Time Series for AAQW Scores over the course of the Measurement Period.



Note. Each Data Point Represents The Mean For A Particular Group And Time Phase.

As outlined in Hypothesis 1, it was expected that participants in the Retreat group would show larger reductions in weight-related experiential avoidance relative to controls. In order to draw statistical inferences about the effect of the Retreat on AAQW, a multilevel model was utilised. The coefficients for this model are displayed in Table 10. The estimate of -0.15 for the retreat group means that starting AAQW scores in this group were only slightly lower than those in the control group by 0.15 units. The rate of change of -0.34 means that control participants showed slight reductions in weight-related experiential avoidance over the course of three months, with scores falling by approximately 0.34 points per month. The group*rate of change interaction of -1.42 means that the Retreat group showed decreases of approximately (-0.34) + (-1.42) = 1.76 points per month in AAQW scores (measured on a scale from 22 to 154) during the measurement period. The fact that the 95% confidence interval for the interaction term includes zero indicates that there is insufficient evidence to reject a null hypothesis of no difference in rate of change between the groups and thus Hypothesis 1 was not supported. Lastly, the correlation coefficient estimate of 1.00 between the random effects displayed in Table 10 indicates that there is insufficient data to reliably estimate all of the correlation parameters in the model and thus this suggests an over-parametrised model. Various model adjustments have been suggested in response to a perfect correlation between random effects including removal of the random slope term to simplify the model (Barr et al., 2013; Matuschek et al., 2017). However, given the random effects were of interest, no modifications were made to the full model.

Table 10

Multilevel Model for Weight-Related Experiential Avoidance.

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	70.05	75.17	79.69	-
Group (Retreat)	-10.16	-0.15	9.00	-0.004
Rate of change (in months, control)	-1.54	-0.34	0.91	-0.028
Group*Rate of Change	-3.82	-1.42	0.94	-0.073
Random effects (SDs)				
Intercept|Participant	12.12	15.74	19.42	
Rate of change|Participant	0.01	0.19	1.42	
Correlation (intercept, rate of change)	-1.00	1.00	1.00	

Note. N = 174 observations across 65 participants. Possible scale range of dependent variable: 22-154.

5.5.2. Hypothesis 1: Sensitivity Analyses

As stated in this study's preregistration, time (measured in months) since weight-loss surgery was included as a covariate to examine the robustness of the main multilevel model. For weight-related experiential avoidance, including time since weight-loss surgery in the main model resulted in a nonsignificant rate of change of -0.51, 95% CI [-1.80, 0.91]. Therefore, there was no change in the estimate and statistical significance of the key interaction between time and group when controlling for the amount of time elapsed between each participant's surgery and their survey completion.

A second sensitivity analysis in the form of a two-way mixed ANOVA was conducted to assess the robustness of the AAQW multilevel model. Group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants who rated their weight-related experiential avoidance at all time points were included in this analysis. For Hypothesis 1, a significant main effect of time was shown, $F(2,84) = 5.20, p < .05, \eta^2 = .023$. Weight-related experiential avoidance at follow-up (M = 73.77, SD = 19.46), was rated lower than at baseline (M = 77.16, SD = 19.41). Mauchly's sphericity test for the repeated measures variable (time) was examined. The main effect of time did not significantly violate the sphericity assumption as the significance value was greater than .05, $W = 0.998$, $p = .975$. Therefore, the F-value for the main effect of time (and its interaction with the between-group variable, Group), did not require corrections for violations of sphericity.

The between groups test indicated there was no significant main effect for intervention, $F(1,42) = 0.003, p = 0.958, \eta^2 = .00006$ however, there was a significant interaction between time and group participation, $F(2,84) = 9.31, p = < .05, \eta^2 = .04$. This means that participants in the Retreat group and the control group were changing over time in different ways. To examine this interaction effect, pairwise comparisons between each group's ratings at baseline, post-intervention, and follow-up were examined with a dependent samples t-test and Bonferroni corrections for multiple comparisons. This resulted in six comparisons (three for each group) for which the descriptive statistics for each group at each time point are displayed in Table 11. For the Retreat group, significant differences in scores were found between baseline and post-treatment, and baseline and follow-up as displayed in Table 12.

Table 11

Descriptive Statistics for the AAQW Scores in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	15	84.33	20.99	67.06	17.77	73.20	17.0
Control	29	73.45	17.79	76.17	21.12	74.07	20.90

Table 12

t-test Results for the AAQW Scores in the Retreat and Control Groups.

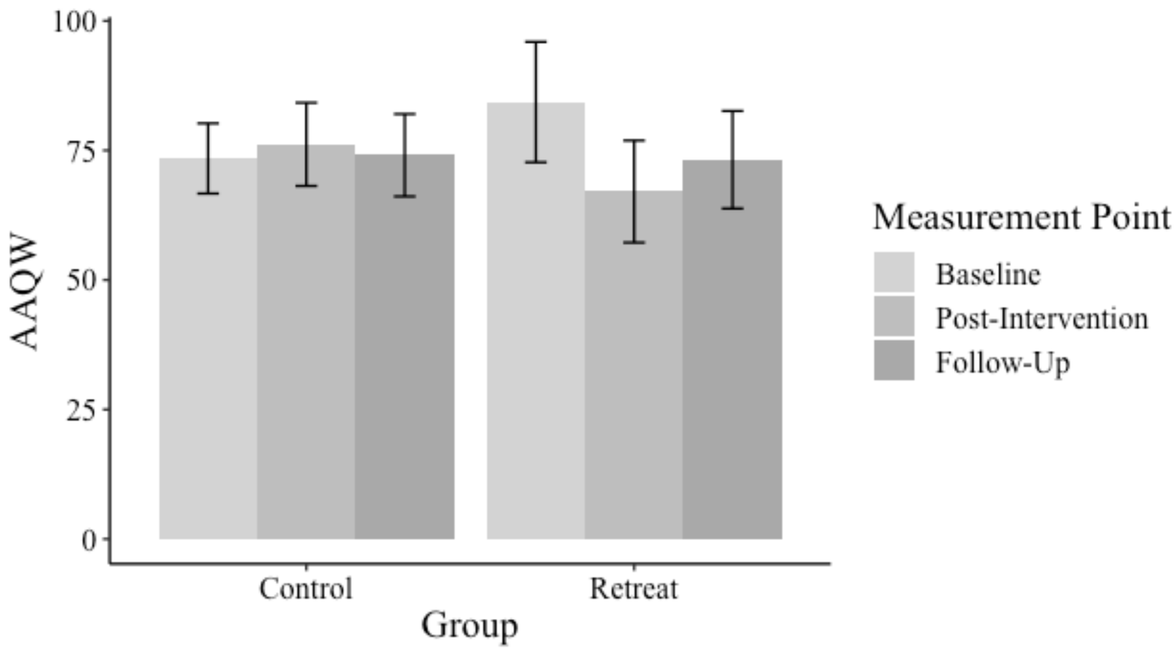
				95% CI for Unstandardised Mean Difference	
Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	Lower	Upper
Retreat					
Baseline to Post-intervention	-0.89	3.56	.003	6.86	27.69
Post-intervention to Follow-up	0.35	-1.61	.129	-14.31	2.02
Baseline to Follow-up	-0.59	3.78	.002	4.81	17.46
Control					
Baseline to Post-intervention	0.14	-1.23	.229	-7.26	1.81
Post-intervention to Follow-up	-0.10	0.75	.457	-3.61	7.82
Baseline to Follow-up	0.03	-0.21	.833	-6.60	5.36

Therefore, as hypothesised, the Retreat group showed a significant decrease in weight-related experiential avoidance from baseline to post-treatment by an average of 17 points, and from baseline to follow-up by an average of 11 points thus providing support for

Hypothesis 1. In contrast, no significant differences were observed in the control group between each time point as shown in Table 12. The interaction effect is displayed as a boxplot with error bars in Figure 7. In summary, the results for Hypothesis 1 are somewhat ambiguous given the discrepancy in findings between the mixed ANOVA and multilevel model for Hypothesis 1, as the significant main effect and interaction effect observed in the ANOVA was not indicated by the multilevel model. This will be further addressed in the discussion section of this thesis.

Figure 7

The Interaction between Group and Time in estimating Weight-Related Experiential Avoidance (AAQW) Scores.



5.6. Hypothesis 2: Disordered Eating

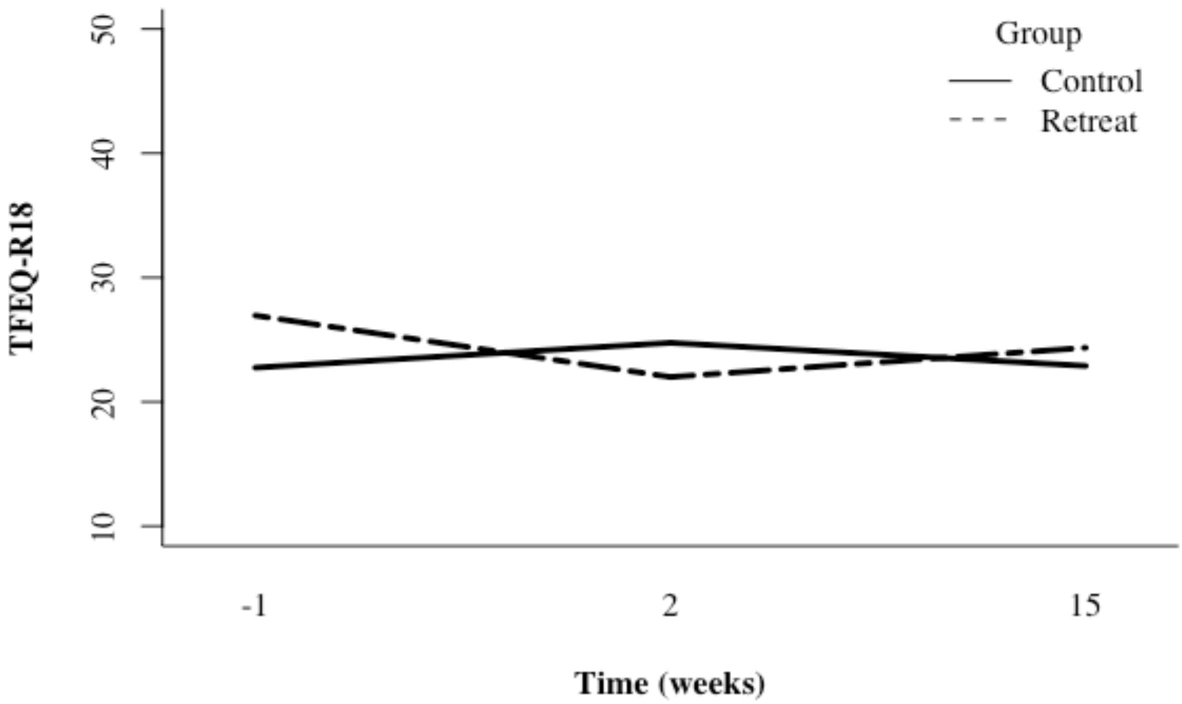
5.6.1. Hypothesis 2: Multilevel Models

At the beginning of the intervention, Retreat group participants had a mean score of 26.95 on the TFEQ-R18 (*SD* = 9.14), improving to a mean of 24.35 (*SD* = 6.48) at follow-up. In contrast, control participants started with lower levels of disordered eating (*M* = 22.75, *SD*

= 6.87) but showed no change at follow-up (*M* = 22.89, *SD* = 7.34). Change in TFEQ-R18 scores over the course of the measurement points are displayed in Figure 8.

Figure 8

Time Series for TFEQ-R18 Scores Over the Course of the Measurement Period.



Note. Each data point represents the mean for a particular group and time phase.

A multilevel model was utilised to test Hypothesis 2 which stated participants in the Retreat group would show larger reductions in disordered eating relative to controls. In Table 13, the estimate of 1.83 for the retreat group means that starting TFEQ-R18 scores in this group were higher than those in the control group by nearly 2 points. The rate of change of 0.24 means that control participants showed very slight increases in disordered eating over the course of three months, with scores increasing by approximately 0.24 points per month. The group*rate of change interaction of -0.82 means that the Retreat group showed slight decreases in disordered eating scores by approximately (0.24) + (-0.82) = -0.58 points per month (measured on a scale from 12 to 48) during the measurement period. The 95%

confidence interval for the interaction term excludes zero which indicates that there is sufficient evidence to reject a null hypothesis of no difference in rate of change between the groups. The multilevel findings thus reinforce the impression visible in Figure 8: Disordered eating levels improved in the Retreat group over time, but not the control group, and thus support Hypothesis 2.

Table 13

Multilevel Model for the Three Factor Eating Questionnaire – Revised 18-Item (TFEQ-R18).

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	21.26	23.29	25.09	-
Group (Retreat)	-2.11	1.83	5.41	0.12
Rate of change (in months, control)	-0.16	0.24	0.66	0.05
Group*Rate of Change	-1.61	-0.82	-0.03	-0.11
Random effects (SDs)				
Intercept|Participant	5.07	6.46	7.93	
Rate of change|Participant	0.013	0.007	1.002	
Correlation (intercept, rate of change)	-1.00	-1.00	1.00	

Note. N = 174 observations across 65 participants. Possible scale range of dependent variable: 12-48.

5.6.2. Hypothesis 2: Sensitivity Analyses

Time (in months) since weight-loss surgery was included in the model as an independent variable to determine whether this influenced the interaction between time and group in the main TFEQ-R18 multilevel model. This resulted in a time since weight-loss surgery estimate of 0.15, which means that for every month since weight-loss surgery, TFEQ scores increased by 0.15 units per month. However, this effect was not statistically significant as shown by the 95% CI [-0.12, 0.4]. There was no change in the estimate and statistical significance of the key interaction between time and group of -0.82, 95% CI [-1.61, -0.04].

As in Hypothesis 1, a two-way mixed ANOVA was performed for the TFEQ-R18 as a sensitivity analysis. Group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants in both groups rated their disordered eating at all three time points. Mauchly's sphericity test for the repeated measures variable (time) was examined. The main effect of time did not significantly violate the sphericity assumption as the significance value was greater than .05, $W = 0.955$, $p = .389$. Therefore, the *F*-value for the main effect of time (and its interaction with the between-group variable, Group), did not require corrections for violations of sphericity.

The results of this ANOVA were consistent with those of the multilevel model included in the main analysis. Descriptive statistics for both groups are displayed in Table 14. The main effects of time and group were not significant. However, there was a significant interaction between the time and group, $F(2,84) = 10.94$, $p = < .05$, $\eta^2 = .04$. To examine this interaction effect, pairwise comparisons between each group's ratings at baseline, post-intervention, and follow-up were examined with a dependent samples t-test and Bonferroni corrections for multiple comparisons. This resulted in six comparisons (three for each group) for which the coefficients of the dependent samples t-tests for both groups and the interaction effects are depicted in Table 15 and presented as a boxplot with error bars in Figure 9. No significant differences were observed in the control group between each time point. The Retreat group showed a significant decrease in weight-related experiential avoidance from baseline to post-treatment by an average of 5 points (TFEQ-R18 scale between 12 and 48) however, no significant differences were present between post-treatment and three months follow-up, or from baseline to follow-up. Thus, the sensitivity analysis provided tentative support for the efficacy of the FOHL Retreat in producing short term improvements in disordered eating which did not extend to three months follow-up. Similar to Hypothesis 1, the correlation coefficient estimate of -1.00 between the random effects displayed in Table 15 suggests that there is insufficient data to reliably estimate all of the correlation parameters in the model; however, no adjustments to the full model were made.

Table 14

Descriptive Statistics for the TFEQ-R18 Scores in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	15	27.53	9.39	22.40	6.71	24.0	6.46
Control	29	21.76	6.44	23.38	6.32	23.66	7.46

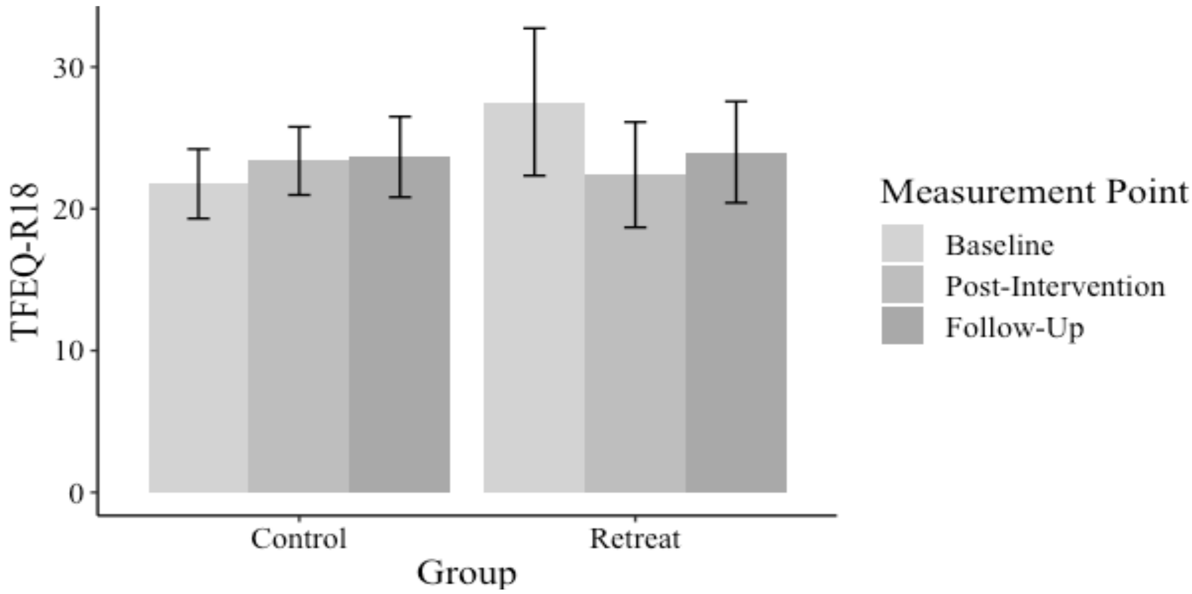
Table 15

t-test Results for the TFEQ-R18 Scores in the Retreat and Control Groups.

Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	95% CI for Unstandardised Mean Difference	
				Lower	Upper
Retreat					
Baseline to Post-intervention	-0.64	3.43	.004	1.92	8.35
Post-intervention to Follow-up	0.24	-1.38	.189	-4.08	0.88
Baseline to Follow-up	-0.45	2.86	.013	0.89	6.18
Control					
Baseline to Post-intervention	0.25	-2.31	.029	-3.06	-0.18
Post-intervention to Follow-up	0.04	-0.33	0.747	-2.01	1.46
Baseline to Follow-up	0.27	-1.84	0.076	-4.00	0.21

Figure 9

The Interaction between Group and Time in Estimating TFEQ-R18 Scores.



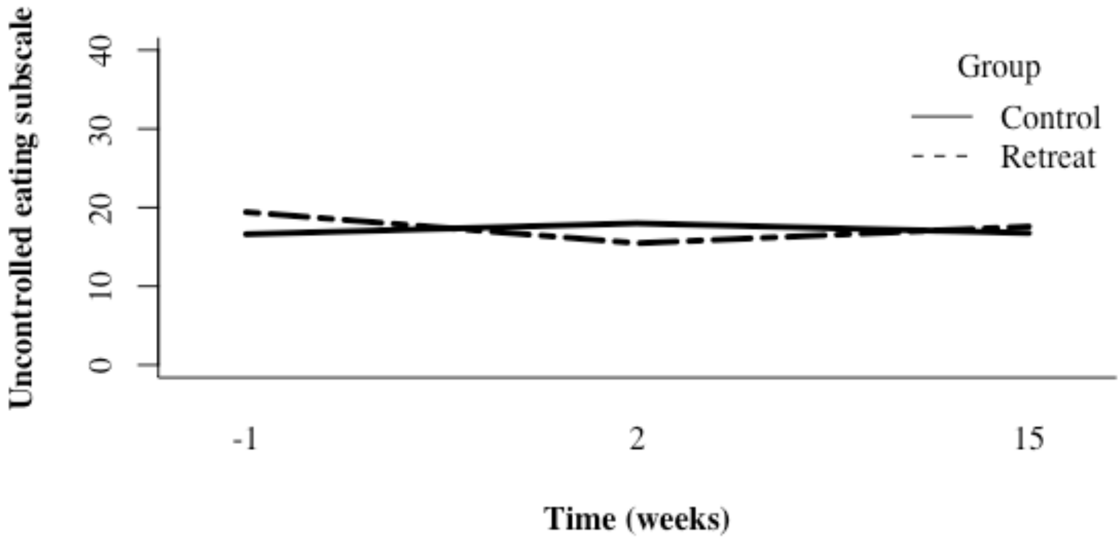
5.7. Hypothesis 3: Uncontrolled Eating

5.7.1. Hypothesis 3: Multilevel Models

At the beginning of the intervention, Retreat group participants had a mean score of 19.42 on the Uncontrolled Eating subscale of the TFEQ (*SD* = 6.87) improving to a mean of 17.59 (*SD* = 4.93) at follow-up. In contrast, control participants started with lower levels of uncontrolled eating (*M* = 16.61, *SD* = 5.12) but showed almost no change at follow-up (*M* = 16.76 *SD* = 5.2). Change in uncontrolled eating scores over the course of the measurement points is displayed in Figure 10.

Figure 10

Time Series for Uncontrolled Eating Subscale Scores over the Course of the Measurement Period.



Note. Each data point represents the mean for a particular group and time phase.

As outlined in Hypothesis 3, it was expected that participants in the Retreat group would show larger reductions in uncontrolled eating relative to controls. In order to draw statistical inferences about the effect of the Retreat on uncontrolled eating, a multilevel model was utilised. The coefficients for this model are displayed in Table 16. The estimate of 1 for the Retreat group means this group began with higher uncontrolled eating scores by approximately 1 point in comparison to the control group. The rate of change of 0.19 indicates that control participants slightly increased in uncontrolled eating by 0.19 points per month. The Group*Rate of change interaction term of -0.56 suggests that in this sample, retreat participants showed a small decrease (-0.56 + 0.19 = -.37) in uncontrolled eating scores over time. Thus, the Retreat group participants' uncontrolled eating scores improved more than did those of the control participants within the sample. However, the 95% confidence interval for the interaction term spans zero, meaning that this effect was not statistically significant and thus there was insufficient evidence to reject the null hypothesis of no difference in the change in uncontrolled eating scores over time between the Retreat and control groups. The correlation of -0.33 between the intercept and rate of change also suggests that participants who started with a higher uncontrolled eating score at baseline tended to show greater reductions over time.

Table 16

Multilevel Model for the Uncontrolled Eating Subscale of the TFEQ-R18.

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	15.47	16.97	18.31	-
Group (Retreat)	-1.95	1.00	3.65	0.09
Rate of change (in months, control)	-0.11	0.19	0.53	0.06
Group*Rate of Change	-1.17	-0.56	0.04	-0.10
Random effects (SDs)				
Intercept|Participant	3.76	4.77	5.83	
Rate of change|Participant	0.01	0.23	0.82	
Correlation (intercept, rate of change)	-1.00	-0.33	1.00	

Note. N = 174 observations across 65 participants. Possible scale range of dependent variable: 9-36.

5.7.2. Hypothesis 3: Sensitivity Analyses

As part of examining the robustness of the main model for Hypothesis 3, introducing time since weight-loss surgery and its interaction with the main time variable resulted in no change to the direction or statistical significance of the key interaction between group condition (Retreat vs. control) and time, with the size of the effect remaining the same $\hat{\beta}$ = -0.56, 95% CI [-1.18, 0.05].

A two-way mixed ANOVA was performed to determine the robustness of the uncontrolled eating multilevel model. Group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants in both groups completed a measure of uncontrolled eating at all three time points. Descriptive statistics for both groups are shown in Table 17. No significant main effect of time was shown, $F(2,84) = 2.85$, $p = 0.064$, $\eta^2 = .012$. The between groups test indicated there was no significant main effect for intervention, $F(1,42) = 0.36$, $p = 0.55$, $\eta^2 = .007$. Unlike in the multilevel model, a significant interaction effect between time and group was shown, $F(2,84) = 11.48$, $p = < .05$, $\eta^2 = .045$ indicating that the rate of change in uncontrolled eating scores differed between the Retreat group and control group. To examine this interaction effect further, pairwise comparisons between each group's ratings at baseline, post-intervention, and follow-up were examined with a dependent samples t-test and Bonferroni corrections for multiple comparisons as displayed in Table 18. The Retreat group showed a significant decrease in uncontrolled eating scores from baseline to post-treatment, and to follow-up, in support of Hypothesis 3. This is different to the multilevel model, which failed to find significant change in uncontrolled eating scores in the longer term (over three months). Interestingly, significant increases were observed among controls from baseline to post-treatment. Figure 11 shows the interaction effect between group and time for uncontrolled eating.

Table 17

Descriptive Statistics for the Uncontrolled Eating Subscale Scores in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	15	19.8	6.89	15.73	4.61	17.27	4.82
Control	29	15.76	4.70	17.07	4.63	17.31	5.28

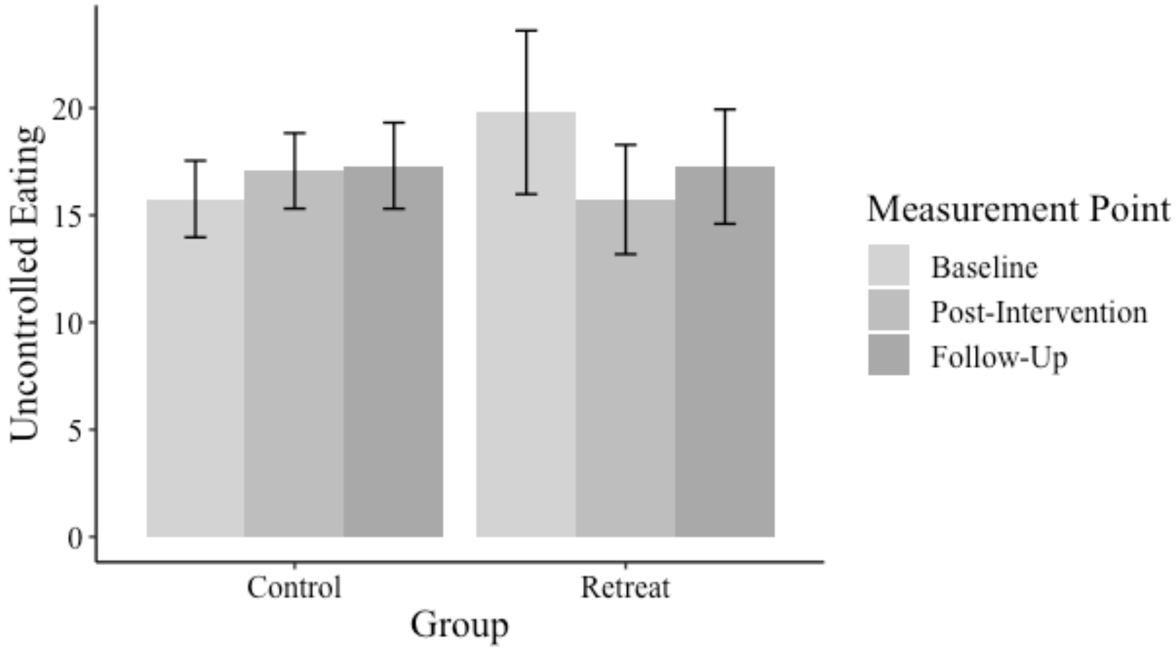
Table 18

t-test Results for the Uncontrolled Eating Subscale Scores in the Retreat and Control Groups.

				95% CI for Unstandardised Mean Difference	
Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	Lower	Upper
Retreat					
Baseline to Post-intervention	-0.71	3.52	.003	1.59	6.55
Post-intervention to Follow-up	0.33	-1.59	.135	-3.60	0.54
Baseline to Follow-up	-0.43	2.64	.020	0.47	4.59
Control					
Baseline to Post-intervention	0.28	-2.56	.016	-2.36	-0.26
Post-intervention to Follow-up	0.05	-0.38	.708	-1.55	1.07
Baseline to Follow-up	0.31	-1.99	.057	-3.15	0.05

Figure 11

The Interaction between Group and Time in Estimating Uncontrolled Eating Scores.



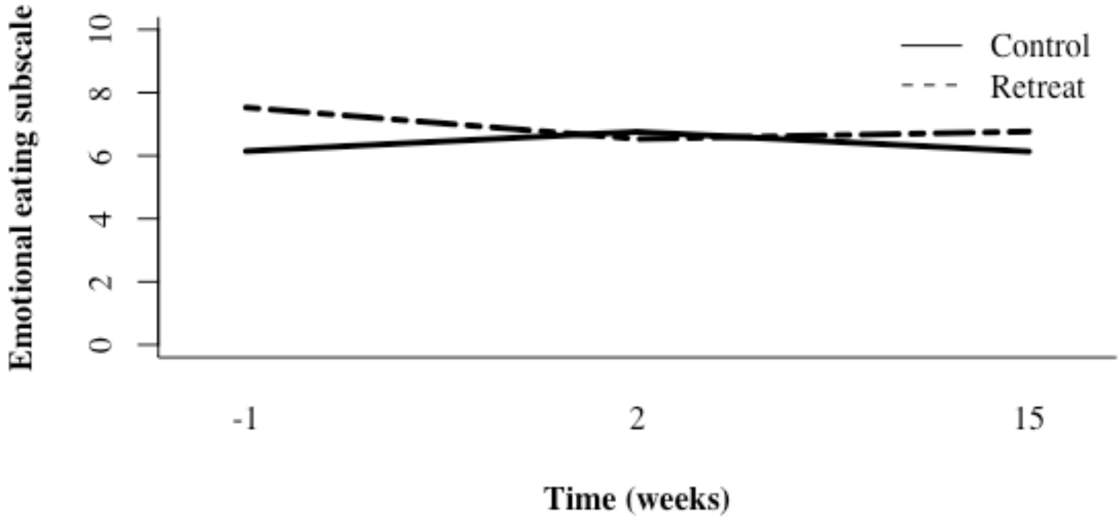
5.8. Hypothesis 4: Emotional Eating

5.8.1. Hypothesis 4: Multilevel Models

At the beginning of the intervention, Retreat group participants included in the multilevel model had a mean score of 7.53 on the Emotional Eating subscale of the TFEQ (*SD* = 2.65) reducing slightly to a mean of 6.76 (*SD* = 2.08) at follow-up. In contrast, control participants started with lower levels of emotional eating (*M* = 6.14, *SD* = 2.2) but showed minimal change at follow-up (*M* = 6.13 *SD* = 2.44), compared to the Retreat group. Change in emotional eating scores for both groups over the course of the measurement points are displayed in Figure 12.

Figure 12

Time Series for Emotional Eating Scores over the Course of the Measurement Period.



Note. Each data point represents the mean for a particular group and time phase.

As outlined in Hypothesis 4, it was expected that participants in the Retreat group would show larger reductions in emotional eating relative to controls. In order to draw statistical inferences about the effect of the Retreat on emotional eating over time, a multilevel model was utilised. The coefficients for this model are displayed in Table 19. The estimate of 0.83 for the Retreat group means that starting Emotional Eating scores in this group were slightly higher than those in the control group by 0.8 points. The rate of change of 0.04 means that control participants showed a very slight increase in emotional eating scores of 0.04 units per month. The Group*Rate of change interaction of -0.24 means that the retreat group showed small decreases in their emotional eating scores over time, by approximately 0.20 units per month (measured on a scale from 3 to 12). This rate of change was not significantly different to the rate of change in the control group, as indicated by the 95% confidence interval for the interaction term which includes zero. Therefore, there is insufficient evidence to reject a null hypothesis of no difference in rate of change between the Retreat group and the control group. As in Hypothesis 1 and 2, the correlation coefficient estimate of 1.00 between the random effects displayed in Table 19 suggests that there is insufficient data to reliably estimate all of the correlation parameters in the model; however, no adjustments to the full model were made.

Table 19

Multilevel Model for the Emotional Eating Subscale of the TFEQ-R18.

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	5.69	6.32	6.88	-
Group (Retreat)	-0.39	0.83	1.93	0.17
Rate of change (in months, control)	-0.09	0.04	0.18	0.03
Group*Rate of Change	-0.50	-0.24	0.02	-0.10
Random effects (SDs)				
Intercept|Participant	1.55	1.97	2.42	
Rate of change|Participant	0.01	0.03	0.03	
Correlation (intercept, rate of change)	-1.00	1.00	1.00	

Note. N = 174 observations across 65 participants. Possible scale range of dependent variable: 3-12.

5.8.2. Hypothesis 4: Sensitivity Analyses

Introducing time since weight-loss surgery into the multilevel model as a sensitivity analysis resulted in no change to the direction or statistical significance of the main effects or the interaction effect between group and time which remained nonsignificant, $\hat{\beta}$ = -0.239, 95% CI [-0.501, 0.017].

A two-way mixed ANOVA was performed as an additional sensitivity analysis to determine the robustness of the emotional eating multilevel model. Group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants in both groups rated their emotional eating scores at all three time points for which the descriptive statistics are depicted in Table 20. As in the multilevel model, no significant main effect of time, $F(2,84) = 1.22$, $p = 0.30$, $\eta^2 = .005$, or group were shown, $F(1,42) = 1.48$, $p = 0.23$, $\eta^2 = .029$. In contrast to the multilevel model for emotional eating, a significant interaction effect was present between group and time, $F(2,84) = 4.48$, $p = 0.01$, $\eta^2 = .017$. This indicates that the emotional eating scores between the Retreat and control group were changing at different rates over time. Pairwise comparisons between each group's ratings at baseline, post-intervention, and follow-up, indicated a significant decrease in emotional eating between baseline and post-intervention among Retreat participants, as shown in Table 21. The interaction between group and time is presented as a boxplot with error bars in Figure 13.

Table 20

Descriptive Statistics for the Emotional Eating Subscale Scores in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	15	7.73	2.89	6.67	2.38	6.73	2.19
Control	29	6.00	2.20	6.31	2.05	6.34	2.47

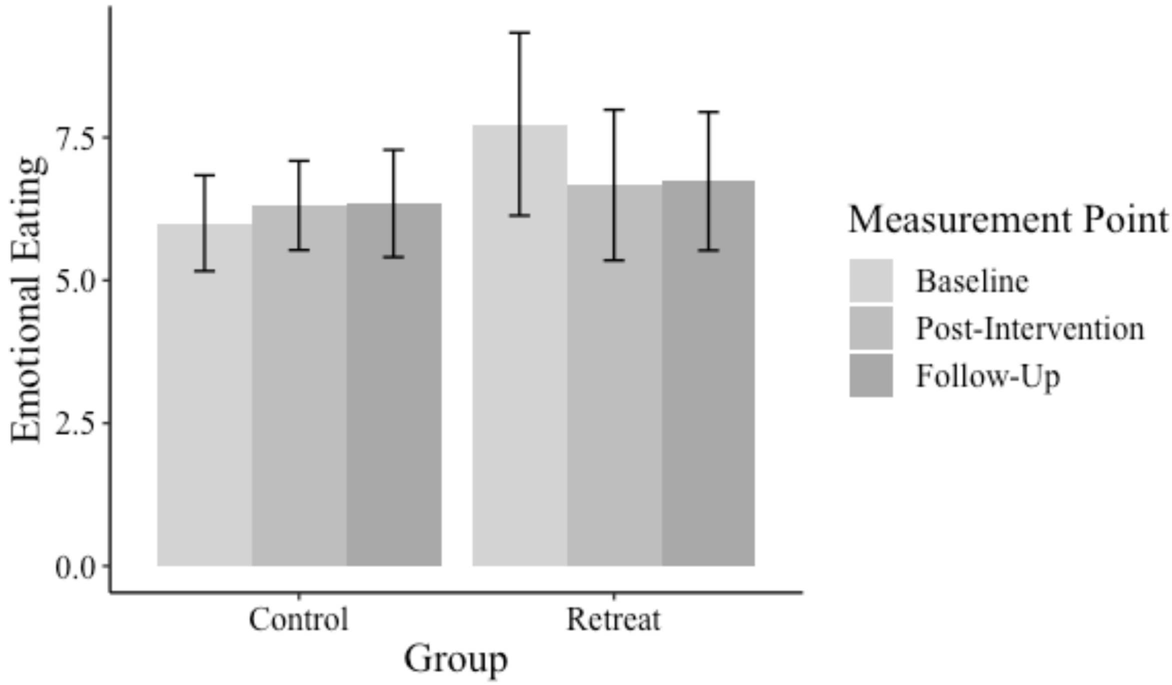
Table 21

t-test Results for the Emotional Eating Subscale Scores in the Retreat and Control Groups.

Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	95% CI for Unstandardised Mean Difference	
				Lower	Upper
Retreat					
Baseline to Post-intervention	-0.40	2.31	.037	0.075	2.059
Post-intervention to Follow-up	0.03	-0.17	.865	-0.890	0.757
Baseline to Follow-up	-0.39	2.14	.051	-0.004	2.004
Control					
Baseline to Post-intervention	0.15	-1.09	.286	-0.895	0.275
Post-intervention to Follow-up	0.01	-0.11	.912	-0.665	0.596
Baseline to Follow-up	0.15	-1.12	.277	-0.982	0.292

Figure 13

The Interaction between Group and Time in Estimating Emotional Eating Scores.



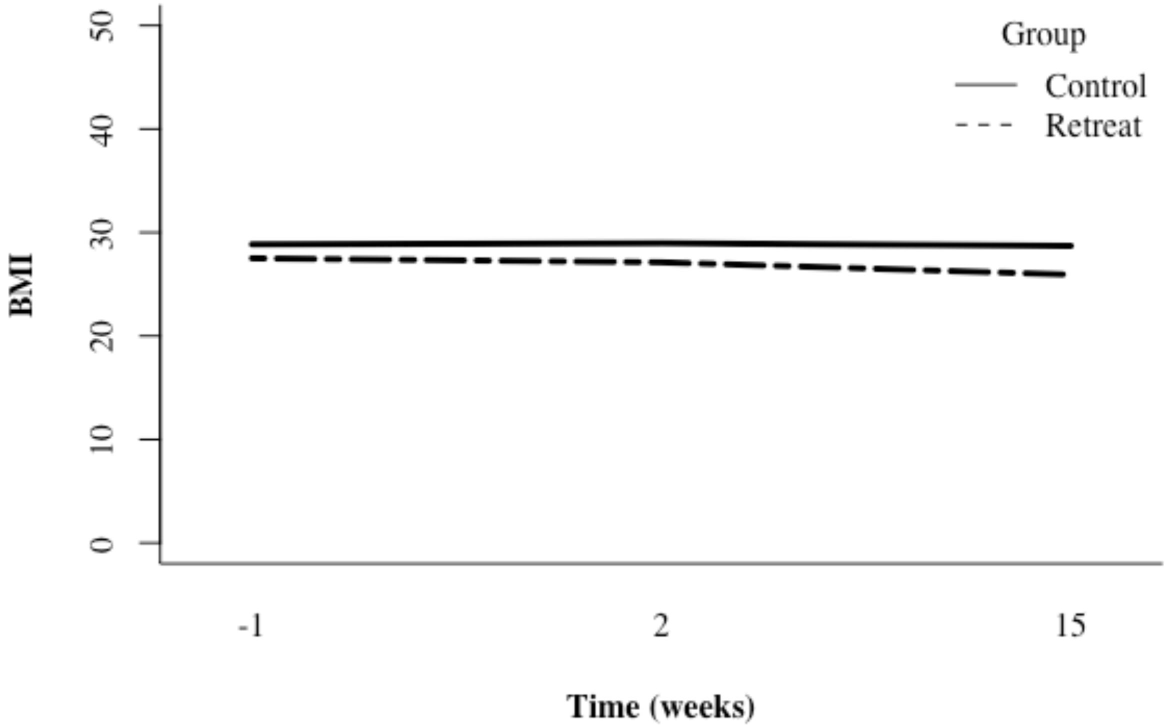
5.9. Hypothesis 5: Body Mass Index (BMI)

5.9.1. Hypothesis 5: Multilevel Models

At the beginning of the intervention, Retreat group participants included in the multilevel model (*n* = 17) had a mean BMI of 27.50 (*SD* = 5.79) improving to a mean BMI of 25.9 (*SD* = 5.30) at follow-up. Control participants started with a slightly higher average BMI (*M* = 28.85, *SD* = 6.04) as the Retreat group, and showed no change at follow-up (*M* = 28.70 *SD* = 5.94). Change in BMI scores for both groups over the course of the measurement points are displayed in Figure 14.

Figure 14

Time Series for BMI over the Course of the Measurement Period.



Note. Each data point represents the mean for a particular group and time phase.

It was expected that participants in the Retreat group would show larger reductions in BMI relative to controls. In order to draw statistical inferences about the effect of the Retreat on BMI, a multilevel model was utilised. The coefficients for this model are displayed in Table 22. The estimate of -1.59 for the Retreat group means that this group started with BMI scores approximately 1.59 points lower than those in the control group. The rate of change of -0.04 means that control participants showed virtually no change in BMI over the course of the measurement period, with BMI scores falling by approximately 0.04 points per month. The Group*Rate of change interaction of -0.37 means that the Retreat group showed very slight decreases in BMI of approximately (-0.04) + (-0.37) = -0.41 points per month over three months. The 95% confidence interval for the interaction term excludes zero which indicates there was some evidence of a difference in rate of change between the two groups (with the Retreat group decreasing in BMI, and the control group remaining the same) and thus, Hypothesis 5 was supported. The correlation of -0.25 between the intercept and rate of change also suggests that participants who started with a higher BMI at baseline, tended to show greater reductions in BMI over time.

Table 22

Multilevel Model for the Body Mass Index (BMI).

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	27.01	28.78	30.43	-
Group (Retreat)	-4.84	-1.59	1.80	-0.12
Rate of change (in months, control)	-0.17	-0.04	0.09	-0.01
Group*Rate of Change	-0.60	-0.37	-0.13	-0.06
Random effects (SDs)				
Intercept|Participant	4.92	5.91	7.04	
Rate of change|Participant	0.28	0.36	0.46	
Correlation (intercept, rate of change)	-0.50	-0.25	0.06	

Note. N = 162 observations across 62 participants.

5.9.2. Hypothesis 5: Sensitivity Analyses

Two sensitivity analyses were performed to determine the robustness of the BMI multilevel model for Hypothesis 5. Firstly, time (in months) since weight-loss surgery was added to the main model as a covariate. There was no main effect of time since weight-loss surgery, $\hat{\beta}$ = 0.136, 95% CI [-0.05, 0.32], and its inclusion resulted in no change in the size, direction, or statistical significance of the key interaction between group and time of -0.37, 95% CI [-0.61, -0.13].

The second sensitivity analysis involved performing a two-way mixed ANOVA where group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants in both groups provided their height at baseline and their weight at all three time points. These values were used to calculate each participant's BMI and the descriptive statistics for each point is displayed in Table 23.

For Hypothesis 5, the between groups test indicated there was no significant main effect for intervention, $F(1,37) = 0.83$, $p = 0.368$, $\eta^2 = .02$. A significant main effect of time was shown, $F(2,74) = 10.66$, $p < .05$, $\eta^2 = .004$. The average BMI for the total sample at follow-up ($M = 27.95$, $SD = 5.93$) was slightly lower than at baseline ($M = 28.63$, $SD = 6.03$). Homogeneity between the repeated measures variable of time in months was examined using Mauchly's sphericity test. The main effect of time did violate the sphericity assumption as the significance value was less than .05, $W = 0.41$, $p = < .05$. This means it could not be assumed that the variances of the differences between all combinations of each time point were equal. Therefore, the *F*-value for the main effect of time (and its interaction with the between-group variable, Group), required corrections for violations of sphericity. A Greenhouse-Geisser correction was applied and results indicated a significant effect of time, $p < .05$.

There was a significant interaction between time and group participation, $F(2,74) = 9.03$, $p = < .05$, $\eta2 = .003$. To examine this interaction effect, pairwise comparisons between each group's ratings at baseline, post-intervention, and follow-up were examined with a dependent t-test and Bonferroni corrections for multiple comparisons. This resulted in six comparisons (three for each group) displayed in Table 24. For the Retreat group, p-values with Bonferroni corrections and 95% CI's indicated significant differences in scores for all combinations of time points (baseline to post-treatment, post-treatment to follow-up, and baseline to follow-up. In contrast, no differences were found between time points in the control group. The interaction effect of the mixed ANOVA is displayed in a boxplot with error bars in Figure 15. Thus, the results of the sensitivity analysis corroborate those of the main analysis and support Hypothesis 5.

Table 23

Descriptive Statistics for Body Mass Index in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	14	28.04	6.26	27.11	6.08	26.28	5.77
Control	29	28.96	6.01	29.04	6.15	28.88	5.93

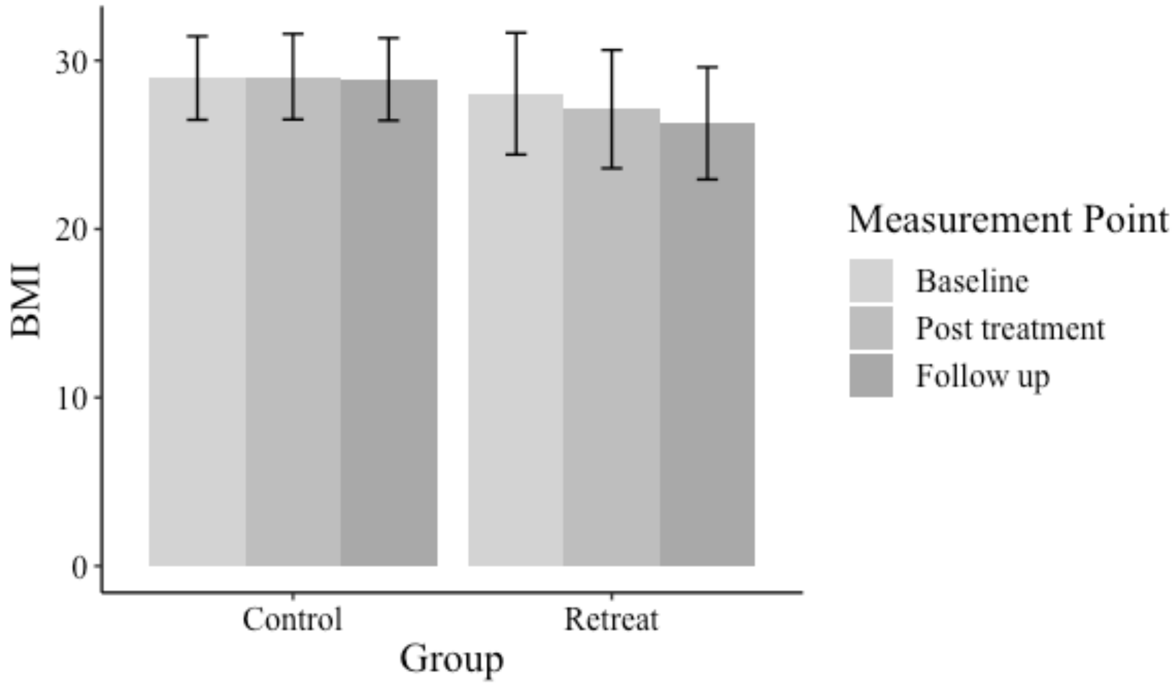
Table 24

t-test Results for Body Mass Index in the Retreat and Control Groups.

Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	95% CI for Unstandardised Mean Difference	
				Lower	Upper
Retreat					
Baseline to Post-intervention	-0.15	6.76	.00	0.63	1.22
Post-intervention to Follow-up	-0.14	5.52	.00	1.07	2.45
Baseline to Follow-up	-0.29	3.56	.00	0.33	1.35
Control					
Baseline to Post-intervention	0.01	-0.66	.52	-0.33	0.17
Post-intervention to Follow-up	-0.03	0.26	.79	-0.53	0.68
Baseline to Follow-up	-0.01	0.48	.64	-0.52	0.84

Figure 15

The Interaction between Group and Time in Estimating BMI.



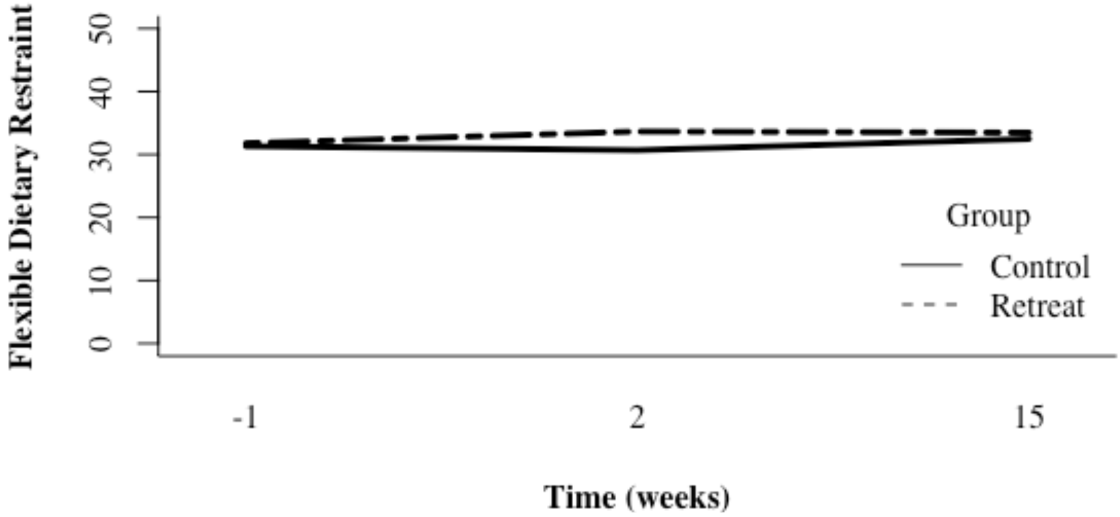
5.10. Hypothesis 6: Flexible Dietary Restraint

5.10.1. Hypothesis 6: Multilevel Models

At the beginning of the intervention, Retreat group participants included in the multilevel model (n = 65) started with an average flexible dietary restraint scores of 31.79 (*SD* = 5.24), improving to a mean score of 33.47 (*SD* = 4.23) at follow-up. Control participants started with a very similar flexible dietary restraint score (*M* = 31.31, *SD* = 5.33), and improved less than the Retreat group at follow-up (*M* = 32.48, *SD* = 4.73).

Figure 16

Time Series for Flexible Dietary Restraint Scores over the Course of the Measurement Period.



Note. Each data point represents the mean for a particular group and time phase.

The graphed results in Figure 16 provide a simple description of how participants in the Retreat and control groups changed over the course of the intervention. The coefficients for the multilevel model are displayed in Table 25. The estimate of 1.27 for the Retreat group means that the Retreat group started with flexible dietary restraint scores approximately 1.27 points higher than those in the control group. The rate of change of 0.27 means that control participants showed slight increases in flexible dietary restraint over time, with scores increasing by approximately 0.27 points per month. The group*rate of change interaction of 0.08 means that the Retreat group showed a slight increase in flexible dietary restraint compared to the control group, by approximately (0.27 + 0.08) = 0.35 points per month. The 95% confidence interval [-0.52, 0.71] for the interaction term spans zero which indicates there was not sufficient evidence of a difference in rate of change between the two groups and therefore Hypothesis 6 was unsupported. Similar to Hypothesis 1, 2, and 4, the correlation coefficient estimate of -1.00 between the random effects displayed in Table 25 suggests that there is insufficient data to reliably estimate all of the correlation parameters in the model; however, no adjustments to the full model were made.

Table 25

Multilevel Model for Flexible Dietary Restraint.

	95% CI lower	Estimate	95% CI upper	Standardised estimate
Fixed effects				
Intercept	29.84	31.18	32.37	-
Group (Retreat)	-1.39	1.27	3.67	0.12
Rate of change (in months, control)	-0.04	0.27	0.60	0.09
Group*Rate of Change	-0.52	0.08	0.71	0.02
Random effects (SDs)				
Intercept|Participant	3.22	4.16	5.14	
Rate of change|Participant	0.02	0.15	0.83	
Correlation (intercept, rate of change)	-1.00	-1.00	1.00	

Note. N = 174 observations across 65 participants. Possible scale range of dependent variable: 12-48.

5.10.2. Hypothesis 6: Sensitivity Analyses

As a supplementary analysis, time since weight loss surgery (in months) was included as a control variable in the multilevel model for flexible dietary restraint. While the size of the interaction between group and time remained the same, in contrast to the main model, the interaction term between group and time indicated significance, $\hat{\beta}$ = 0.07, 95% CI [-0.15, 0.17]. As the 95% confidence interval for the supplementary model included zero, there was insufficient evidence to reject the null hypothesis of there being no difference in the rate of change of flexible dietary restraint scores between the Retreat group and control group when time since weight-loss surgery is controlled for in the model.

A two-way mixed ANOVA was also performed to determine the robustness of the multilevel model for Hypothesis 6. Group (Retreat or control) was the between-subjects factor and time was the within-subject factor coded as a nominal variable with three points representing baseline, post-intervention, and follow-up measurements. Participants in both groups rated their flexible dietary restraint scores at all three time points for which the descriptive statistics are displayed in Table 26. Results were similar to the multilevel model for flexible dietary restraint. No significant main effect of time was shown, $F(2,84) = 1.65$, $p = 0.2$, $\eta^2 = .009$. The between groups test indicated there was no significant main effect for intervention, $F(1,42) = 1.31$, $p = 0.26$, $\eta^2 = .02$. The interaction effect between time and group was not significant, $F(2,84) = 2.75$, $p = .07$, $\eta^2 = .01$ indicating there was not a significant difference in the rate of change in flexible dietary restraint between the Retreat group and control group. Pairwise comparisons, as shown in Table 27, indicated a significant increase in flexible dietary restraint among controls between post-intervention and follow-up. Figure 17 depicts this in a box plot with error bars below.

Table 26

Descriptive Statistics for Flexible Dietary Restraint in the Retreat and Control Groups.

		Baseline		Post-intervention		Follow-up	
Group	*n*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Retreat	14	31.87	5.56	34.06	5.44	33.67	3.87
Control	29	31.71	5.49	30.85	4.30	32.28	4.98

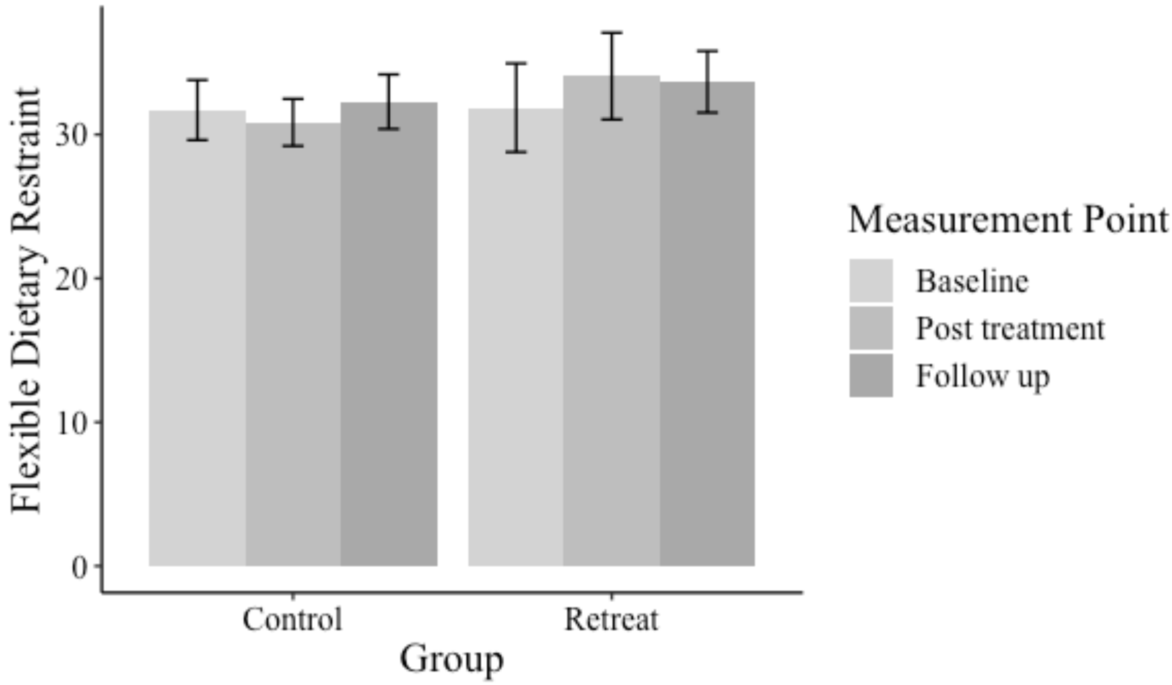
Table 27

t-test Results for Flexible Dietary Restraint in the Retreat and Control Groups.

Group	Effect size (*d*)	*t* value	Bonferroni corrected p value	95% CI for Unstandardised Mean Difference	
				Lower	Upper
Retreat					
Baseline to Post-intervention	0.40	-1.82	.09	-4.79	0.39
Post-intervention to Follow-up	-0.08	0.44	.66	-1.54	2.34
Baseline to Follow-up	0.38	-1.89	.08	-3.84	0.24
Control					
Baseline to Post-intervention	-0.18	1.12	.27	-0.71	2.43
Post-intervention to Follow-up	0.31	-2.20	.04	-2.78	-0.10
Baseline to Follow-up	0.11	-0.64	.53	-2.42	1.26

Figure 17

The Interaction between Group and Time in Estimating Flexible Dietary Restraint.



5.11. Mediation

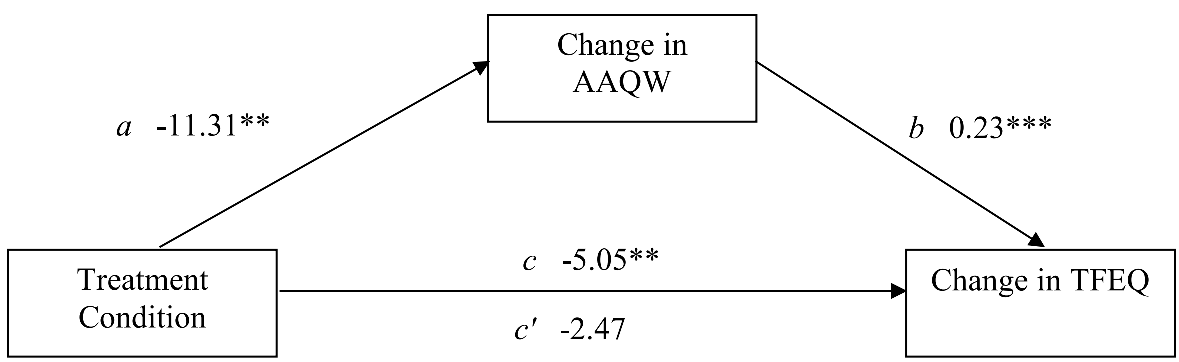
The present research examined whether the Foundations of Healthy Living Retreat produced change in the main outcome variables in the theoretically expected way, that is, through targeting experiential avoidance. A mediational analysis was used to assess whether pre to follow-up changes in disordered eating and BMI were mediated by pre to follow-up changes in experiential avoidance as hypothesised (Hypothesis 7 and 8). Mediating effects were tested by estimating the direct and indirect effects. The indirect effect refers to the effect of the ACT-based intervention (Retreat) on eating behaviour and BMI through its effect on weight-related experiential avoidance. The direct effect refers to the effect of the Retreat on eating behaviour and BMI when holding weight-related experiential avoidance constant. Mediation was assessed in R using the *mediation* package (Tingley et al., 2019). A cross-product test was utilised in which the significance of the cross product of the coefficients for the intervention group to mediator relation (path a), and the mediator to outcome relation controlling for the intervention (path b) was examined. A non-parametric multivariate extension of the cross-product test was used and included bootstrapping with 1000 simulations where the cross-product test was calculated on each bootstrapped sample.

5.11.1. Hypothesis 7: Mediation Analysis

Hypothesis 7 assessed whether pre to follow-up changes in disordered eating were mediated by pre to follow-up changes in experiential avoidance. Treatment condition (either Retreat or control group) was used to predict change in disordered eating scores from baseline to follow-up. Subjects who included AAQW and TFEQ-R18 scores at baseline and follow-up were included in the analysis (*n* = 55). An AAQW and TFEQ-R18 change score was calculated for each participant, by subtracting their AAQW and TFEQ-R18 total scores at baseline from their respective follow-up totals. Data were screened for multivariate outliers, leverage, and influence and assumptions of regression were tested and appeared satisfactory. See Figure 18 for a visual diagram of the mediated relationship.

Figure 18

Mediated Relationship between Treatment Condition and Total Change in Disordered Eating (From Baseline to Follow-Up) with Change in Weight-Related Experiential Avoidance as the Mediator.



Notes. *** $p < .001$, ** $p < 0.01$, * $p < .05$. Effect sizes are unstandardised.

First, using steps described by Baron and Kenny (1986), treatment was a significant predictor of change in disordered eating (TFEQ-R18) (the *c* pathway), as shown in Table 28.

The treatment condition showed lower TFEQ-R18 scores than the control condition, $t(53) = -3.33$, $p < .05$. Second, treatment condition was used to predict the mediator variable of change in AAQW scores (the *a* pathway), which showed that treatment condition was negatively related to change in AAQW scores, $t(53) = -2.78$, $p < .01$. Third, the relationship between the mediator change in AAQW scores and change in TFEQ-R18 was examined controlling for the treatment condition (the *b* pathway). AAQW change was positively related to the TFEQ change, $t(52) = 5.62$, $p < .001$. Lastly, the mediated relationship between group and TFEQ-R18 change score was examined for a drop in prediction when the mediator was added to the model (the *c'* pathway). Mediation was found, and the relationship between treatment condition and TFEQ-R18 change was no longer significant after controlling for AAQW, $t(52) = -1.91$, $p = .06$. These results are consistent with the effect of the intervention on changes in disordered eating being fully mediated by change in weight-related experiential avoidance. Bootstrapping using a bias-corrected cross-product test was performed to test the significance of the indirect effect in the mediation model illustrated in Figure 18.

Unstandardised indirect effects were computed for each of the 1,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardised indirect effect was -2.59, and the 95% confidence interval ranged from -4.99 to -0.81. Thus, the indirect effect was statistically significant ($p < .01$). The estimates and 95% confidence intervals for the average causal mediation effect (ACME), average direct effect (ADE), and total effect for Hypothesis 7 are shown in Figure 19.

Table 28

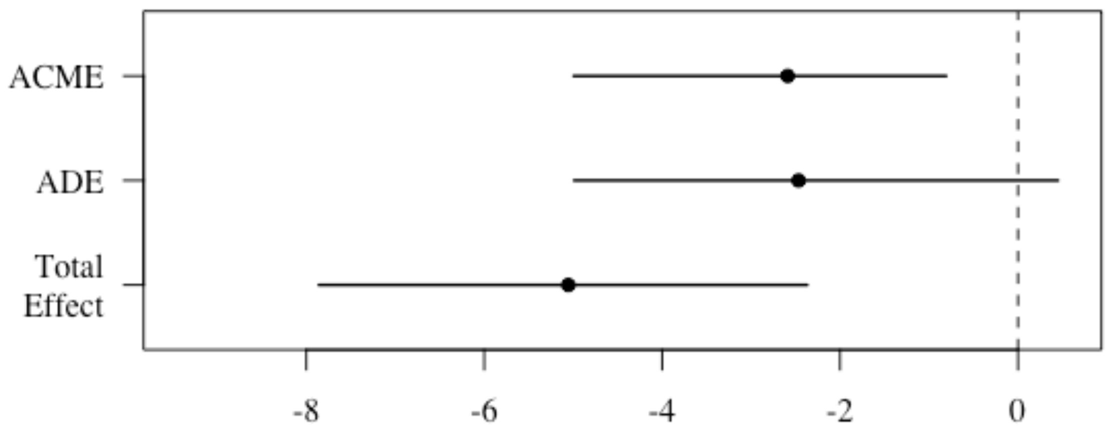
Mediation Effects of Change in Weight-related Experiential Avoidance over 3 Month (AAQW) on the Relationship between Group (G) and Change in Disordered Eating over 3 Months (TFEQ) (N = 55).

Regression paths	*B*	*t*	*p*
Hypothesis 7			
Mediation *a* path (G on AAQW)	-11.31	-2.78	< .01
Mediation *b* path (AAQW on TFEQ)	0.23	5.62	<.001
Total effect, *c* path (G on TFEQ; No mediator)[a]	-5.05	-3.33	< .01
Direct effect *c'* (G on TFEQ including AAQW as mediator)	-2.47	-1.91	.06
Indirect effect bootstrapped (*c* – *c'*) with bootstrapped 95% CI	-2.59 [-4.99, -0.81]		

Notes. *B* = unstandardised coefficient; *CI* = confidence interval. Fit for TFEQ model R^2=.49, Adjusted R^2=.47, $F(2, 52) = 24.57$, p<.001.

Figure 19

Estimates (Points) and 95% Confidence Intervals for the Average Causal Mediation Effect (ACME), Average Direct Effect (ADE), and Total Effect for Hypothesis 7.



Note. The solid points and lines represent ACME and ADE for the sample (*n* = 55).

Weight-related experiential avoidance mediated 51% of the total effect of the intervention on change in disordered eating from baseline to follow-up. Table 28 displays the output of the bootstrapped cross product test. A sensitivity analysis was used to assess the robustness of the mediation effect to the potential violation of sequential ignorability. The output displayed in Table 29 illustrates that for the indirect effect to be zero, the correlation between the residuals of the regression models for the mediator and the outcome variable would need to be $\rho = .60$, the confounders of the mediator-response relationship together explain 36% or more of the residual variance, and the total variance explained by confounders is greater than 16%.

Table 29

Mediation Sensitivity Analysis for Average Causal Mediation Effect for Hypothesis 7.

Rho	ACME 95%	CI Lower 95%	CI Upper 95%	$R^{*2}_{M} R^{*2}_{Y}$	$\tilde{R}^{2}_{M}\tilde{R}^{2}_{Y}$
[1,] 0.4	-1.14	-2.33	0.05	0.16	0.07
[2,] 0.5	-0.67	-1.67	0.33	0.25	0.11
[3,] 0.6	-0.10	-0.99	0.79	0.36	0.16
[4,] 0.7	0.67	-0.33	1.67	0.49	0.22

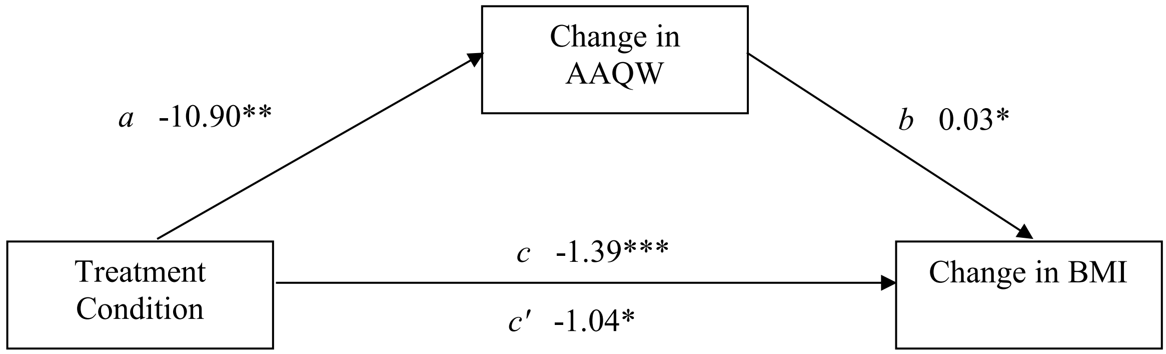
Note. Rho at which ACME = 0: 0.6, $R^{*2}_{M} R^{*2}_{Y}$ at which ACME = 0: 0.36, $\tilde{R}^{2}_{M}\tilde{R}^{2}_{Y}$ at which ACME = 0: 0.16

5.11.2. Hypothesis 8: Mediation Analysis

Hypothesis 8 aimed to determine whether pre to follow-up changes in BMI were mediated by pre to follow-up changes in experiential avoidance. Treatment condition (either Retreat or control group) was used to predict change in BMI from baseline to follow-up. As in Hypothesis 7, subjects who included AAQW scores and their BMI at baseline and follow-up were included in the analysis ($n = 53$). An AAQW and BMI change score was calculated for each participant, by subtracting their AAQW total score and BMI at baseline from their respective follow-up scores. Data were screened for multivariate outliers, leverage, and influence and assumptions of regression were tested and appeared satisfactory. See Figure 20 for a visual diagram of the mediated relationship.

Figure 20

Mediated Relationship between Treatment Condition and Total Change in BMI (From Baseline to Follow-Up) with Change in Weight-Related Experiential Avoidance as the Mediator.



Notes. *** $p < .001$, ** $p < 0.01$, * $p < .05$. Effect sizes are unstandardised.

Using steps described by Baron and Kenny (1986), treatment was a significant predictor of change in BMI (the *c* pathway), as shown in Table 30. The Retreat group showed lower BMI scores than the control condition, $t(51) = -3.44$, $p < .001$. Second, treatment condition was used to predict the mediator variable of change in AAQW scores (the *a* pathway), which showed that the treatment condition (Retreat) was negatively related to change in AAQW scores, $t(51) = -2.66$, $p < .01$. Third, the relationship between the mediator change in AAQW scores and change in BMI was examined controlling for the treatment condition (the *b* pathway). AAQW change was positively related to BMI change, $t(50) = 2.44$, $p < .05$. Lastly, the mediated relationship between treatment and BMI change score was examined for a drop in prediction when AAQW change scores were added to the model (the *c'* pathway). Mediation was found, and the relationship between intervention and BMI remained significant after controlling for AAQW, $t(52) = -2.53$, $p = .01$. These results indicate that the effect of the intervention on changes in BMI is partially mediated by change in weight-related experiential avoidance. Bootstrapping using a bias-corrected cross-product test was performed to test the significance of the indirect effect in the mediation model illustrated in Figure 20. Unstandardised indirect effects were computed for each of the 1,000 bootstrapped samples, and the 95% confidence interval was computed by determining the indirect effects at the 2.5th and 97.5th percentiles. The bootstrapped unstandardised indirect effect was -0.35 and statistically significant, 95% CI [-0.77, -0.06]. The estimates and 95% confidence intervals for the average causal mediation effect (ACME), average direct effect (ADE), and total effect for Hypothesis 7 are shown in Figure 21.

Table 30

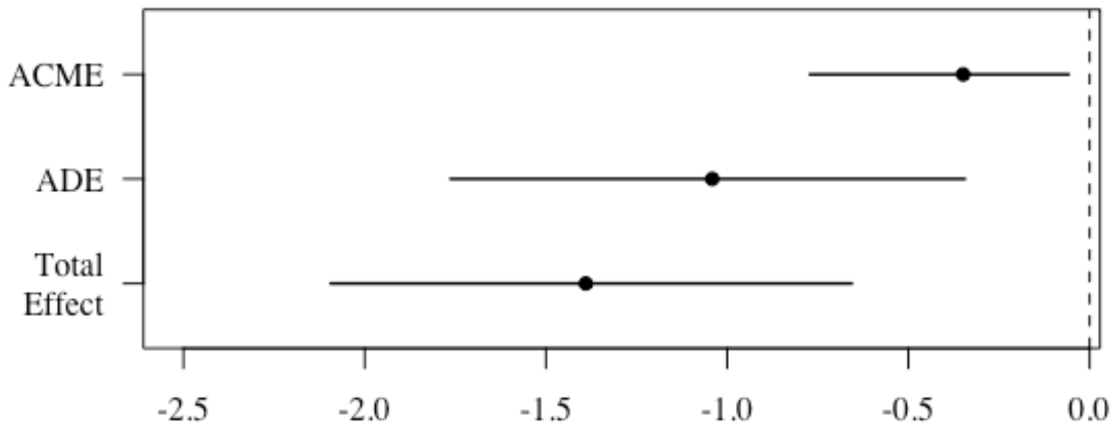
Mediation Effects of Change in Weight-related Experiential Avoidance over 3 Month (AAQW) on the Relationship between Group (G) and Change in BMI over 3 Months (BMI) (N = 53).

Regression paths	*B*	*t*	*p*
Hypothesis 8			
Mediation *a* path (G on AAQW)	-10.90	-2.66	< .01
Mediation *b* path (AAQW on BMI)[a]	0.03	2.44	< .01
Total effect, *c* path (G on BMI; No mediator)	-1.39	-3.44	< .001
Direct effect *c'* (G on BMI including AAQW as mediator)	-1.04	-2.53	< .01
Indirect effect bootstrapped (*c* – *c'*) with bootstrapped 95% CI	-0.35 [-0.77, -0.06]		

Notes. B = unstandardised coefficient; *CI* = confidence interval. Fit for BMI model R^2=.27, Adjusted R^2=.25, $F(2, 50) = 9.46$, p<.001.

Figure 21

Estimates (Points) and 95% Confidence Intervals for the Average Causal Mediation Effect (ACME), Average Direct Effect (ADE), and Total Effect for Hypothesis 8.



Note. The solid points and lines represent ACME and ADE for the sample (*n* = 53).

Weight-related experiential avoidance mediated 25% of the total effect of the intervention on change in BMI from baseline to follow-up. Table 30 displays the output of the bootstrapped cross product test. A sensitivity analysis was used to assess the robustness of the mediation effect to the potential violation of sequential ignorability. The output displayed in Table 31 illustrates that for the indirect effect to be zero, the correlation between the residuals of the regression models for the mediator and the outcome variable should be ρ = .30, and the confounders of the mediator-response relationship together should explain 9% or more of the residual variance. Consequently, the robustness of the average causal mediation effect (ACME) in this model is uncertain as potential confounders would need to explain only a small portion of the remaining variance in the mediator and outcome for the ACME to be 0.

Table 31

Mediation Sensitivity Analysis for Average Causal Mediation Effect for Hypothesis 8.

Rho	ACME 95%	CI Lower 95%	CI Upper 95%	$R^{*2}_M R^{*2}_Y$	$\tilde{R}^2_M \tilde{R}^2_Y$
[1,] 0.0	-0.35	-0.72	0.03	0.00	0.00
[2,] 0.1	-0.25	-0.58	0.08	0.01	0.006
[3,] 0.2	-0.14	-0.44	0.15	0.04	0.03
[4,] 0.3	-0.03	-0.31	0.25	0.09	0.06
[5,] 0.4	0.09	-0.19	0.38	0.16	0.10
[6,] 0.5	0.24	-0.09	0.56	0.25	0.16

Note. Rho at which ACME = 0: 0.3, $R^{*2}_M R^{*2}_Y$ at which ACME = 0: 0.09, $\tilde{R}^2_M \tilde{R}^2_Y$ at which ACME = 0: 0.06

5.12. Summary of Results

The main findings of the multilevel models presented in this chapter indicated whether changes over time in the main outcome variables including weight-related experiential avoidance (Hypothesis 1), disordered eating (Hypothesis 2), uncontrolled eating (Hypothesis 3), emotional eating (Hypothesis 4), BMI (Hypothesis 5), and flexible dietary restraint (Hypothesis 6) were larger in the Retreat group compared to the control group. Results of the multilevel models supported Hypotheses 2 and 5 as the Retreat group showed larger reductions in disordered eating and BMI over time than the control group. The results of the multilevel models for Hypotheses 1, 3, 4, and 6 indicated that the Retreat group displayed reductions in weight-related experiential avoidance, uncontrolled eating, and emotional eating over time however, these changes were not significantly different to the control group. Similarly, a multilevel model showed increases in flexible dietary restraint in the Retreat group over time however, these changes were not significantly different to the control group and therefore there was insufficient evidence to reject the null hypothesis of no difference in rate of change between groups.

A mediation model was performed to test Hypothesis 7 with treatment condition as the predictor, change in AAQW scores as the mediator, and change in TFEQ-R18 scores from baseline to follow-up as the outcome variable. A significant mediation effect was found and the relationship between treatment condition and disordered eating was no longer significant when controlling for weight-related experiential avoidance. Results indicated that AAQW scores fully mediated the effect of the Retreat on changes in TFEQ-R18 scores and therefore Hypothesis 7 was supported. Hypothesis 8 was also supported by a mediation model with treatment condition as the predictor, change in AAQW scores as the mediator, and change in BMI from baseline to follow-up as the outcome variable. A significant mediation effect was found and the relationship between treatment condition and disordered eating was smaller and remained statistically significant when controlling for weight-related experiential avoidance. These results suggested that AAQW scores partially mediated the effect of the Retreat on changes in BMI.

6. Qualitative Results

Given that the present study aimed to evaluate the efficacy of a psychological intervention, it was important to understand participants' experiences of their weight, food, and eating and how they perceived these were impacted by the intervention. Thus, a qualitative component was included in the study; open-text response format questions were used to broadly explore personal experiences by inviting reflections of participant's thoughts, feelings and behaviours. With the intention of providing a wide description of the dataset, expansive questions were devised in the absence of a pre-existing theoretical framework, to allow for response breadth. This aimed to extend knowledge of the needs of this population and enhance understanding of the value of the FOHL Retreat in addressing these. There is significant value to be gained from these results, based on their potential to influence the development and delivery of psychological interventions for the post weight-loss surgery population.

6.1. Thematic Analysis

Thematic analysis, as per Braun and Clarke's (2006) guidelines, was conducted to identify, analyse, and report themes within the qualitative data. Braun and Clarke (2006), postulate that thematic analysis offers a systematic and theoretically flexible approach to qualitative analysis, making it suitable for use in under-researched areas where prior awareness of participant views and experiences are limited. It has also been widely utilised to investigate bariatric surgery individuals' experiences pre- and post-surgery and was thus considered an appropriate method for the present research (Ogden et al., 2006; Ogle et al., 2016; Parretti et al., 2019; Wee et al., 2006).

Another advantage of thematic analysis can be found in its theoretical freedom and subsequent compatibility with various epistemological stances (Braun & Clarke, 2006). The present study conducted thematic analysis within a critical realist paradigm with acknowledgement to the way individuals make meanings of their experiences and in turn, the ways the broader social context affects those meanings. An inductive thematic analysis at the semantic level was conducted; themes were derived from the explicit meanings of the data and the researcher did not attempt to extend beyond the text response for interpretation. This level of interpretation was deemed appropriate, as qualitative data was limited to text responses that were relatively short in length and thus unlikely to provide the depth of information necessary to examine underlying ideas and assumptions. Furthermore, text responses by nature resemble a one-way interaction without opportunity for the researcher to elicit intent and meaning through reciprocal conversation. Hence, a semantic approach aligned with the type of analysis chosen; one which conveys the broader meanings across the entire dataset with the advantage of limiting assumptions that may bias results (Braun & Clarke, 2006).

A detailed account of the steps involved in the present study's thematic analysis is outlined below. In line with Braun and Clarke's (2006) guidelines, analysis was performed in six phases which were repeated for separate analysis of each of the four open-ended questions as follows:

1. How would you describe your journey with food and body weight leading up to your decision to have weight-loss surgery?
2. How has your surgery impacted how you feel about yourself and food?
3. Are there any barriers that continue to prevent you from fulfilling your health-related goals?
4. How has your participation in the Foundations of Healthy Living Retreat affected your psychological wellbeing?

The analysis was data-driven, as it concentrated on each individual's perspective and account of their experiences (in the aforementioned areas), as opposed to producing an objective account of these domains.

The first step involved the researcher immersing herself with the data content. This involved reading the full text responses repeatedly to allow for familiarisation with the data. Performing this step several times was important for increasing awareness of the dataset content, especially in the absence of the transcription process. During this phase, the researcher highlighted the main terms used in each response and from these, generated a list of ideas pertaining to initial patterns within the data, prior to identifying initial codes.

Phase 2 involved generating initial codes in the data for each qualitative question. A coded sheet was constructed for each question, and initial codes of interest were generated based on commonality and saliency of responses across the data for each question.

Next, as part of phase 3, initial codes were removed, merged, and refined on the sheet; initial themes were generated from these amended codes. These themes were revised to ensure they were not repetitive, they were relevant to the research questions, and they represented the whole dataset. Initial themes were refined such that overlapping, closely-related concepts such as food control and addiction were combined into one superordinate theme to provide structure and clarity.

Lastly, themes were labelled and these names were reviewed to ensure they adequately captured each theme, before the findings were reported in the Results section. Direct quotes are presented in italics and quotation marks (" ") while words within square brackets or an ellipsis in square brackets ([…]) indicates that a word has been added or omitted to ensure clarity of the quotation and the anonymity of the respondent.

6.1.1. Reflexivity

By taking an epistemological stance to the data analysis using an inductive, semantic, and realist approach, the personal meanings and individual realities of participants' relationships with their weight, food, and eating could be explored. While the length of text responses varied across the dataset, responses were relatively short in length (up to a paragraph) and without opportunity to further explore these areas with participants, the experiences of each participant were unable to be interpreted beyond their surface level meanings.

It is important to recognise however, that the principal researcher's clinical experience, background, and conceptions may have influenced the information participants decided to share and shaped the qualitative data analysis. Whilst the principal researcher had not experienced bariatric surgery, her academic and clinical experience working with individuals experiencing disordered eating behaviour and eating disorders informed her understanding of the various psychological and physical challenges this population encounter and increased her awareness of the limitations of current medical and psychological interventions surrounding weight management. It is therefore possible that such awareness influenced the nature of the analysis. In order to mitigate the impact of potential researcher biases on the data analysis process, efforts were undertaken to exercise reflexivity at every stage of the research. The literature review process was beneficial in increasing the researcher's vigilance towards her own conceptions surrounding the topics of obesity and weight-loss surgery which were critically reflected upon with the research team. This increased awareness was also useful when generating the open-ended research questions to ensure questions were unpresumptuous and did not predispose participants towards a specific perspective when responding. Furthermore, with recognition to potential interpretation bias, the researcher consulted the research team during the analysis process to ensure that themes identified were trustworthy.

6.2. Results

Given that each open-ended question explored a different topic, separate thematic analyses were conducted for each question. The first question pertains to *Relationships to Food and Body Weight Leading up to Surgery* and contained the largest amount of data. Seventy-two participants reflected on various food and body weight-related struggles they endured prior to surgery. Question Two elicited 77 responses and covers *Impacts of Weight Loss Surgery* which illustrates the substantial and somewhat immediate physical and psychological transitions participants underwent following their surgery. Question Three, referred to as *A Work in Progress*, describes the persistent health challenges participants continued to encounter postoperatively and explores ways in which participants navigate these difficulties based on 73 responses. Lastly, Question Four received 6 responses and explores *Impacts of the Foundations of Health Living Retreat*. This demonstrates how attendance at the Foundations of Healthy Living Retreat affected participants' relationships with food and themselves post-surgery. The themes for each main question have been outlined in Table 32.

Table 32

Themes from Thematic Analyses of Four Open-Text Response Format Questions.

Question Topic	Themes
Question One: Relationships to Food and Body Weight Leading up to Surgery	• Food: Crutch or foe? • Negative Body Image • The Dieting Dilemma • Physical Health Concerns
Question Two: Impacts of Weight Loss Surgery	• Improved Physical Health • The New Self • Restoring Control over Food
Question Three: A Work in Progress	• The Component between my Ears • Physical Health Barriers • Practical Constraints
Question Four: Impacts of The Foundations of Health Living Retreat	• A New Perspective • A Shared Experience • Support after the Retreat

6.2.1. Relationships to Food and Weight Leading up to Surgery

Across all responses, several aspects of participants' lives had been negatively impacted by their complex relationships to food, eating, and their body weight. The overwhelming majority of participant responses (97%) described longstanding psychological difficulties with food and self-image. Attempts to address these issues often precipitated and perpetuated problematic eating behaviours which in turn, adversely impacted physical health over time.

6.2.1.1. Food: Crutch or Foe? When sharing their personal journeys leading up to bariatric surgery, most participants described a tumultuous relationship with food characterized by *"addiction"* and *"obsession"*. It occupied a disproportionately dominant position in participants' lives as many felt controlled by strong food preoccupations and its *"toxic"* pull which *"ruled and ruined my lifestyle."* The essence of this complex relationship was encompassed by one participant's response: *"It ruled my life, always thinking of it, scared to be without food close at hand"*.

Responses reflected an internal conflict marked by a strong attachment to food which was accompanied by the simultaneous desire to avoid it. Food was both a *"hazard"* and a source of *"comfort"* such that participants felt *"tormented"* yet simultaneously reassured by it. Individuals felt *"trapped"* in this conflict and described it as a *"lifelong struggle"*. For one participant, the significance of food was partly attributed to cultural norms and practices which had been internalized. Thus, participants conveyed their need to manage cultural expectations pertaining to eating habits in the context of personal food and weight-related goals that may not always align: *"...food is a big part of our culture. This means I have cultural norms to also manage."*

Most participants viewed eating as a maladaptive coping mechanism for managing emotional discomfort. A few participants reflected on emotional eating as an attempt to cope with significant psychological difficulties that they were unsure how to otherwise manage - such as social anxiety, depression, and trauma. For some, emotional eating developed during childhood, as food provided a sense of comfort and security that had been absent in the context of early experiences of trauma. This is highlighted by one participant's account: *"I have struggled with my weight all my life. I was born [11 pounds] and I have gone through significant trauma as a child. I have eaten as a reaction to this. Even though I have addressed the trauma it did not assist with the eating patterns and the feelings generated."*

Others ate in response to more immediate and stated-based discomfort, resulting from stress, boredom, sadness, and anxiety. Eating patterns that often resembled overeating or binge eating episodes typically alleviated negative emotions as both a source of distraction and pleasure: *"Up till having [bypass surgery], food was not a friend but a crutch, to help feel good about myself....I would scoff food and it did make me feel better, but later my body suffered."* The temporary reprieve was short-lived however, as participants demonstrated awareness that emotional eating also carried psychological repercussions which appeared to be exacerbated by dichotomous beliefs about food *"Eating healthy for half the week and then eating anything I want the other half. All or nothing dieting mentality and feeling happy when eating well and full of shame and guilt when eating bad foods."*

Overeating resembled a deviation from participants' values, a loss of control, and a sense of failure to achieve an important goal of being *"healthy"*. Thus, restrictive eating behaviours were employed to compensate for overconsumption and restore a sense of autonomy. However, restriction strengthened cravings over time whilst simultaneously depleting cognitive resources required to override these. Participants described their patterns of overeating and restriction as *"chaotic"* and *"physically and emotionally painful"*. They felt unable to break this cycle, yet identified themselves to blame: *"I would very rarely have breakfast - most afternoons at about 3pm or 4pm is when I wanted to eat something sweet. I found food a good way to help me when I felt down. I wouldn't know when to stop eating - I would eat till I was full and then some."*

Some participants mentioned being in *'denial'* about the severity of their behaviours and the negative impact this had on their lives. As a result, the cycle was tolerated for many years before significant change was undertaken: *I don't think I really let it sink in how bad I was until it started to affect my health. I would just eat whatever I wanted whenever I wanted, then feel bad about it but do it again as soon as I felt hungry again."*

6.2.1.2. Negative Body Image. Body image disturbances were frequently mentioned by participants who described persistent feelings of dissatisfaction towards their bodies.

Individuals expressed feeling "*trapped"* in a body they *"hated"* and perceived as *"unattractive".* Existing in a body that was incongruent with one's ideal body weight caused significant discomfort and shame for many, resulting in loss of confidence and avoidance: *"Hated my body to the point I no longer had confidence in social situations and would avoid going out."* Others described how their weight-related shame interfered with family relationships: *"I felt unattractive and that affected my social life and relationship with my husband and children."* One participant identified their negative self-image as a clear barrier to spending quality time with their children due to perceiving themselves as a potential source of embarrassment: "*I hated myself and the way I looked I was embarrassed to go out in public and never did anything with my children because I didn't want to embarrass them."*

Interestingly, two participants described a discrepancy between their physical appearance and self-perception. They did not experience themselves as *"obese"* prior to surgery: *"My brain never made me see myself as overweight unless I saw myself in a photo or a mirror etc. I didn't think I had a problem with food."* As a result, this participant appeared to overlook their food issues which delayed help seeking behaviour. Despite admitting their lack of awareness at the time, another participant retrospectively described themselves as *'an obese person who acted thinner,'* highlighting both an awareness and internalisation of weight-based identity stereotypes.

Attributions about negative body image emerged and included traumatic experiences of weight stigma that were subsequently internalised. Participants cited specific instances where their weight had been scrutinised by others. This further emphasized the disproportionate societal value placed on body size as a measure of social conformity and self-control. Participants cited childhood experiences of being body shamed in various forms by family and peers, in the absence of justifiable weight-related health concerns: *"Even my Plunket book has an entry saying I'm a fat baby. Bullied through school for being fat."* One participant recalled being expected to change their appearance from a young age: *"My mother put me on my first diet when I was 8 years old & has always told me I'm fat and eat too much & need to control myself. My first memory is of Mum telling my grandparents not to give me a chocolate bar because I was too fat. I was about 5 years old."* The adverse impact of stigma was noted by one participant whose negative body image and comfort eating worsened following a negative encounter with a health professional: *"I got to see a [health professional] who told me that at [current weight] I was too fat to have corrective surgery. This affected my body image and made me worse. I ate more as comfort food. The more I tried the more weight I put on."*

6.2.1.3. The Dieting Dilemma. A vast majority of participants reflected on their experiences of *"yoyo dieting"* as an attempt to gain control over their weight and improve self-image. Dieting was described as "*a continual hard journey of success and failure"* characterized by weight cycling as participants vacillated between short term weight-loss and regain: *"I dieted a lot then gained back what I had lost and more."*

Diet regimes characterized by restrictive eating practices and avoidance of *"bad"* foods proved effective yet inherently difficult to sustain: *"I had tried many, many diets and fads. Some had worked for a little while, but none had worked long term"*. For some, the success of initial weight loss was superseded by the subsequent challenge of weight maintenance, which participants described as unobtainable in the presence of competing demands and difficulty sustaining the high levels of self-control dieting required. Consequently, participants lost motivation and abandoned their diet regimes: *"My weight was always going up and down with diets I couldn't stick to long term. Once I lost interest I'd go back to old habits", "[Weight] It went up and down, lost with diets but then doubled it when went off them".* Such digressions appeared to be perceived as personal failures by some: *"Yo-yo dieting my whole life, complete sense of failure and helplessness at my inability to lose* *weight & keep it off"* and left participants feeling disempowered and helpless. Thus, for many, the journey to weight control through dieting was "*random, messy, and unhealthy"* with *"no real reward"*.

6.2.1.4. Physical Health Concerns. Approximately 25% of participants cited medical and physical health concerns as a key motivation for surgery. It must be noted that the relatively low number of responses citing physical health issues may not represent the number of participants who were both impacted and influenced by health issues leading up to their decision to have surgery. It is possible that this reflects the breadth of the research question which did not directly ask participants to indicate their reason for seeking surgery. Therefore, while some did so, the majority of participants focused more generally on their historical relationships with body image and food.

Weight loss was described as both a preventative and responsive measure to serious health concerns. A growing awareness of the long-term physical health implications of unhealthy eating habits and excess weight gain appeared to be an impetus for change among those who had struggled with their weight for many years. Both those with and without existing health conditions demonstrated concern for their health and the risks associated with obesity-related conditions. While one participant described reaching their own realization that "*it was a life or death situation",* many recognized the severity of their conditions following medical health diagnoses and information from health professionals: *"Finally prediabetes & skyrocketing blood pressure gave me the impetus to seek help", "The information and tasks I was given help me realise my relationship with food was killing me. We had to break up. We did. I moved on".* This prompted initial consideration of weight-loss surgery as a responsive effort to increase longevity and reduce adverse impacts of health conditions such as diabetes, high cholesterol, and arthritis: *"My objective for WLS was to increase life expectancy and stop diabetes, high cholesterol, gout etc, which has been achieved", "I had serious health* *issues (diabetes, osa, spinal damage, acute arthritis, heart failure) so desperately needed to lose weight. I was addicted to bad food choices and suffered from a severe disability…., making it almost impossible to exercise."*

In addition to treating medical health concerns, weight loss surgery was also sought to resolve other physical issues (associated with excess weight) which adversely affected quality of life, mood, and existing psychological difficulties. A few participants described practical difficulties acted as motivators to seek surgery, stating they were unable to "*buy clothes, move easily or do up the seatbelt in my car"* as a result of their weight. Another participant cited significant others as an important factor in their decision to have surgery and described feeling held back from living the life they desired with their family: *"I decided for my health and that of my family I couldn't continue the way I was. I knew that I was missing out on living the life I wanted with my family."*

6.2.2. Impacts of Weight Loss Surgery

All participants described significant improvements in their relationships with food and body weight following surgery. Several physical and psychological benefits were derived from surgical weight loss as participants were finally freed from the constraints obesity imposed upon them. Improved physical health, body image, self-confidence, quality of life, and perceived control were noted. Results are reported under the following themes; '*Improved Physical Health'* and *'The New Self'* which includes discussion of improved body-image, acceptance, and perceived control.

6.2.2.1. Improved Physical Health. In fulfilment of one of its overarching goals, participants appeared to perceive that weight-loss surgery significantly improved health-related quality of life. Several participants reflected positively on their surgery which restored their physical health by resolving medical conditions and relieving chronic physical discomfort. As a result, participants felt liberated from the restraints of carrying excess weight and living with debilitating obesity-related health conditions: *"I feel free from the constraints of a fat body. I no longer have [several health conditions]. I am also able to jog and walk again."*

These benefits appeared to outweigh residual food urges as one participant described their willingness to sacrifice food-related pleasure for their health improvements: *"My health has improved considerably which has made life better, even though I would still like to have certain fatty foods, food is now just something I have to have to survive."*

In addition to the direct impact of surgery, ongoing support from health professionals (in the form of routine follow-up appointments) maintained patient accountability and motivation through the provision of feedback regarding post-operative progress: *"The surgery has helped me to certainly control my portion sizes and helped me to lose a further [number of kilos] in addition to the [amount] I had lost pre surgery. I have been grateful for the aftercare with medical professionals as I've had further help to continue looking at my thinking and regular blood tests have proved that I'm on the right track. So the impact has had a huge positive impact and has greatly improved my quality of life."* Evidently, bariatric surgery produced radical health improvements that participants recognised they needed help to maintain.

6.2.2.2. The New Self. A striking distinction was drawn between pre-surgery and post-surgery self as participants shared experiences of feeling like a "*new"* person following their procedures. Participants spoke of how substantive and rapid weight loss facilitated a significant transition in self-perceptions, by moving them closer to prevailing body size ideals, allowing participants to feel more *normal.* Being a *"normal body weight"* was described as far more "*rewarding than being overweight"* as participants felt they were *"truly living now".* The essence of this experience was captured by the following response: *"Surgery has given me my confidence back and returned me to feeling normal again".* Most also viewed themselves far more favorably post-surgery, as depicted by responses that reflected a positive self-image and identity, with participants describing themselves as "*confident, proud and attractive",* suggesting the powerful influence of reduced (internalised) weight stigma and the centrality of physical appearance as a core component of self-identity.

Some participant responses suggested that weight loss had powerful effects on mitigating high levels of *"shame"* and perceived *"failure"* associated with existing in larger bodies. Weight loss appeared to facilitate significant and positive changes to participants' self-perceptions, highlighting the extent to which body size and internalized weight-stigma influenced perceptions of self-worth: *"I feel so much better about myself, can do so much more. Being fat was to me, being a failure", "I actually like myself now and am sad that I wasted so many years not liking myself."*

Happiness was also derived from experiencing the physical and psychological self as more congruent post-surgery, as one participant described the stronger alignment between their post-surgery physical appearance and their view of self: *"I can see my face in the mirror now (no more bloated person looking back at me - I can see my cheekbones) and feel my body matches how I think about myself."* However, in direct contrast, one participant described retaining body image dissatisfaction despite undergoing significant weight loss: *"How I feel about myself hasn't changed a lot. I still "see" myself as overweight unless I see a photo or pass a mirror and see what I look like now".* Thus, while psychological transformations often coincided with physical changes, there was individual variation.

In addition to increased self-acceptance, participants also felt more socially accepted after surgery. A strengthened sense of social belonging was gained and reinforced by others who positively acknowledged participants' physical transformations. One participant described feeling "*great especially when everyone notices and responds".* Relief was felt by those who no longer experienced the same degree of negative judgment, *"fatism",* self-doubt, and embarrassment in public settings: *"I don't have to second guess myself in social settings", "I feel hugely better about myself and I am so much more confident in public situations", "I feel better about myself and more free to exercise comfortably and feel less out of place."*

For some, the positive reinforcement from others served as a reminder of the weight stigma they perceived had previously unjustly affected their lives in various domains. Responses reflected the disproportionate value placed on societal weight ideals: *"I don't feel as judged by others. [I] have realised how much harder I've had to work in my career as an obese person to be heard and valued", "People treat me differently which I feel is wrong. Somehow I am now valued in society."*

Greater acceptance from the self and others decreased fears of negative evaluation and motivated participants to participate in activities they had previously avoided, such as socialising: *"I now have the confidence that I look good and feel great which enables me to get out and mix with people and take up activities that I couldn't do before".* The pleasure and enjoyment of being more active was shared by many: *"Most days I feel really good about myself. Love being able to get out and do things I have been unable to do for years", "I'm 100% more active and actually enjoy activity."*

6.2.2.3. Restoring Control over Food. In many cases, surgery marked a victorious end to an enduring battle for control over one's body and eating. Prior to surgery, attempts to control body weight created long histories of weight cycling and problematic eating patterns as individuals fought against food's *"toxic pull"*. However, surgery caused substantial reductions in physical hunger; thus, interest in food markedly decreased.

This facilitated large adjustments in participants' relationship with food in several ways. For many, these physiological changes reduced psychological hunger and weakened the connection between food and emotion. In the absence of food cravings, urges, and pleasure, personal attitudes towards food adjusted dramatically as participants reclaimed control over their eating: *"I realise I don't need that much food to survive and I am okay with small amounts. I don't have cravings nearly at all now, whereas they were constant before the surgery"*, *"I'm happier because I'm healthier and my relationship with food has changed because eating is no longer enjoyable".*

For some, food no longer held the same value: *"Being in control, happier, more alive, free - food is not important to me"* while others developed a more pragmatic view of food and prioritized eating for nutrients, energy, and survival: *"It has changed my view on amounts and made me more aware of what we can live on successfully, and the amount that others eat"*, *"I now think of food as fuel, I only put in what I know will keep my body going".*

This may be partly attributable to the desire to avoid unpleasant physical effects that occurred as a result of overeating or consuming the *"wrong"* foods after surgery*: "I still love the idea of food, but don't enjoy it so much and certainly don't enjoy the fullness and tightness I feel from eating more than is required".* This motivated adherence to post-operative guidelines, which appeared to simplify participants' relationships with food by reducing the responsibility and pressure associated with making food decisions.

Nevertheless, some participants became more considered in their food choices and implemented various strategies such as food monitoring and cutting out certain foods, to maintain a healthy lifestyle: *"I'm careful about what food I buy, reading the labels and selecting high protein, low fat and sugar foods. I rarely cook meals. Always leave food on my plate. Don't snack between meals. I can admire food dishes but don't necessarily have to eat it."*

Attitudes towards postoperative eating changes were described on a continuum, with some participants adjusting to these changes more easily than others, as exemplified by the following two contrasting responses. The first respondent describes their willingness to compromise enjoyment of certain foods for more healthful choices: *"Even though I would still like to have certain fatty foods, food is now just something I have to have to survive".* Another expressed occasional frustration towards the restrictions surgery had imposed: *"I get mad sometimes when I can't eat a big meal".* Interestingly, one participant illustrated a more flexible approach to their food intake which allowed for both health and pleasure: *"I still enjoy food but I see it a lot differently now, instead of just being about satisfaction through flavor (and often calories), I also think about satisfaction through nutrition as well as flavour and I enjoy it differently. I eat a lot more holistically now rather than conveniently".*

Ultimately, surgery offered *"a practical helping hand"* for participants to achieve their health-related goals that previously felt beyond reach. Some claimed that surgery helped to restore a sense of autonomy they had long strived for in their relationships with food, which in turn, increased confidence in their own ability to live a healthier, more fulfilling life: *"I now have an effective tool to use to manage my weight and it is totally up to me what I put in my mouth. I now have a choice and it is an empowering position to be in. I have learned more about what food choices help me be healthy & stay healthy. I don't want to go back to the way things were."*

6.2.3. A Work in Progress

Evidently, weight-loss surgery fulfilled participants' long-held desires to lose weight and improve quality of life. Most participant responses suggested that surgery offered a temporary reprieve from the personal responsibility of managing weight, as participants were able to passively observe their bodies change. A strong sense of empowerment came from experiencing weight loss without struggling with competing hunger or cravings, allowing participants to strengthen personal autonomy, self-confidence and self-esteem. However, over time and with the gradual return of hunger, practical, physical, and psychological barriers to personal health goals resurfaced. These have been reported under the following three themes: *'The Component Between My Ears'* which refers to the psychological barriers identified by participants, *'Physical Health Barriers'*, and *'Practical Constraints'*.

6.2.3.1. "The Component Between My Ears." The mind was undoubtedly considered the biggest barrier to achieving post-surgery personal health goals for all participants. Despite physical weight loss, for some participants, fears of *"losing control"* and weight regain continued to dominate their relationship with food: *"I am on the only barrier! I need to live without the fear of gaining weight! I can rationalise this but the fear is a reality. The fear of failure. So even though I have lost 40kg and the body is looking ok, it is still the association of food and fear".*

"It has really helped but I have developed a fear of putting weight back on. I worry if I will or when I will put it on. Then I revert to some of my unhealthy food choices. The bypass surgery helps to a point but it's the psychological changes that need to be occurring along with the body changes. Body, food and weight are a constant fear but it is my reality."

This commonly coincided with the end of the *"honeymoon phase"* of surgery, as marked by the point in which weight loss slowed, hunger returned, and professional input reduced. During this stage, participants' perceptions of their surgery changed, as most adopted a more realistic perspective by recognising it was not the *"cure"* to problematic eating patterns as they may had initially hoped. Many admitted they still struggled with food issues: *"I still have food addiction issues such as head hunger", "I am now beginning to feel a bit out of control again, emotional eating."*

Some participants realised that significant behavioural changes were required to sustain ongoing success and varied in the levels of self-trust they had in their ability to maintain postoperative outcomes. This provoked significant worry for all who were determined to protect their weight loss but felt ill-equipped to resist old eating habits, as difficulties were still considered beyond personal control: *"I still struggle to control impulse eating, but I am determined to never return to the state I was in before surgery"*. Participants feared how *"easy"* it would be to revert to old behaviours and patterns of thinking that compromise success: *"I would still love to eat carbs and sweets. I struggle with not snacking between meals now that my hunger is coming back. It is so easy to fall into old habits e.g an ice cream with [family],, a sweet thing when having coffee at a cafe, eating cake or muffins at the office morning tea shout or when a colleague brings in chocolates. It is easy to think, I can eat that I won't put on weight, but that is not true, it's the thin end of the wedge and before I know it I'd be doing it everyday like over Christmas"*.

The inability to conquer these difficulties caused disappointment and a sense of failure for those who reflected on the disparity between their current state and where they desired to be in their progress: *"I loved being in the honeymoon period. But that has passed and I am back to massively negative thoughts and food obsession. I am reasonably intelligent and am disappointed that I can't change the way I think and feel about myself and food"*.

One participant described how this adversely impacted their depression, though they remained determined to resist eating for comfort: *"My head sometimes rules my heart and I give in to temptation. I still struggle to exercise due to the condition of my knees. I had high hopes that losing the weight would ease the pain. Unfortunately, this has not eventuated and I find myself in the same amount of pain as before. This often makes me depressed, but I am determined to not turn to food for sympathy."*

Some became extremely self-critical of their postoperative eating digressions, labelling themselves with stigmatising terms such as *"slack"* and *"lazy."* This seemed to perpetuate the maladaptive emotional eating cycle that many wished to avoid: *"My relationship with food is still a struggle as most of my old habits are now back in full force so I love to eat all these delicious foods then will beat myself up for eating them and then go* *right back to eating them again".* Participants felt stuck in these struggles and unsure of how to address them: "*Over a period of time with personal circumstances happening in my life I have continuously eaten the wrong food and have spiralled out of control and need help to get back in control of my eating habits but don't know where to look".* Another stated: *"Not sure where to ask for help, did try dietician but they just recommended the retreat."*

In contrast, others viewed the self as both their greatest opponent and strongest ally. Increased levels of self-confidence and self-trust had a protective effect against weight regain, by motivating participants to take a more active role in addressing ongoing issues by firstly utilizing their internal resources: *"I never ate through stress, but purely through boredom. That is still my biggest risk to weight gain but I love my new self so much that I use that as my main ally in remaining at my new weight"*; and secondly, seeking help when needed: *"At this point in time, I'm not doing so well and making a lot of wrong choices. I have recently met with my psychologist and dietitian and hope to get back on track".* Many were also reassured by the *"tools"* they had acquired throughout the surgery process and felt capable of utilizing these to ensure they retained control in their relationship with food: "*I am confident with my body though I am still aware that I have an addictive relationship with food, I feel that the surgery gave me the tools to manage that so now I feel that I am the master of that relationship - not the other way around".*

6.2.3.2. Physical Health Barriers. For a handful of participants, pre-existing physical health conditions continued to impair individuals' ability to pursue their goals. In particular, exercise was a struggle for those who felt debilitated by muscle and joint pain: *"My knees are a frustration but have got stronger as my weight decreases and I have enrolled myself at [gym], bought an orchard to help me become more active and enjoy my life and become stronger".* Additionally, one participant felt more physically vulnerable post-operatively, perceiving themselves as more susceptible to sickness post-surgery: *"I have found that I do* *seem to catch a lot of bugs and viruses since my weight loss. I worry that eating less fruit and vegetable impacts on the body's immunity since protein is consumed first and veg secondly, and fruit is generally advised to avoid at this stage in any significant quantity. Being sick sets you back with any health-related goals, and once sick, I seem susceptible to other bugs and germs".*

6.2.3.3. Practical Constraints. Lastly, prioritising the self post-surgery appeared to be difficult for those who cited financial constraints and competing demands across life domains challenged their adherence to positive lifestyle changes. Daily work and family commitments were time consuming and depleted physical and cognitive resources required to maintain exercise and diet regimes. Consequently, participants struggled to prioritise their own wellbeing: *"I don't have enough hours in my day at the moment. I am finding that I am very busy and have struggled recently to devote time to my own wellbeing. I am aware of this though and working to remedy it without falling into bad habits".*

However, determined to *"stay on track"*, a few participants described seeking resources to manage their health in the context of these practical constraints. For one participant, this involved paying for a meal delivery plan as exemplified by the following response: "*One way I have done this is to start getting [meal-kits] delivered. It is healthy fresh meals delivered that take minimal time to make and suits the whole family. It has made life a lot easier."*

6.2.4. Impacts of the Foundations of Healthy Living Retreat

For some, seeking postoperative support included attending the Foundations of Healthy Living retreat, from which many derived several psychological benefits. The Retreat appeared to be a strong source of motivation for participants to remain focused on their goals. Through this experience, participants felt more equipped with new strategies and empowered to pursue their health goals through an increase of their own psychological resources. The impacts of the Retreat have been explored under the following three themes: *'A New Perspective', 'A Shared Experience', and 'Support after the Retreat.'*

6.2.4.1. A New Perspective. Based on responses, the Retreat appeared to provide participants the opportunity to reconnect with themselves and others they could relate to. Experiential learning through active engagement in therapeutic activities (and reflection on those activities) facilitated significant self-growth and assisted participants in developing a stronger understanding of themselves and the "component between my ears" (referring to the mind). The Retreat assisted individuals to view themselves more holistically and by doing so, many developed both a greater awareness of their personal needs: *"[The Retreat] helped me to view myself as a multifaceted person with needs (e.g. exercise) which need to be catered to even when I don't feel like it",* and the triggers of their problematic eating: *"It has given me an understanding of the psychology and triggers of eating".*

Greater understanding of one's struggles also appeared to increase self-compassion, as ongoing difficulties were described in the absence of negative judgment: *"I am more conscious, I understand more of why I think like I do and how to work on changing that. Aren't afraid of exercise love new dishes I learnt. I am kinder on myself and happier."* The Retreat also enabled the development of adaptive coping strategies that assisted participants to effectively manage adverse emotions known to trigger old eating patterns. Participants integrated the nutritional knowledge, insight, and practical techniques they acquired during the Retreat to support themselves through challenges: "*It has given me an understanding of the psychology and triggers of eating, to be able to differentiate between head hunger and physical hunger, to understand portion sizes and healthy food options by the food provided, tips and tools for understanding why I overeat or make unhealthy food choices".*

Learning to recognise and distinguish between thoughts, feelings, and behaviours was described as helpful in addressing common struggles such as differentiating between physical and psychological hunger. Participants engaged in practices such as mindfulness and visualisation to diffuse from negative thoughts and feelings that often felt all-consuming. This provided participants with a stronger sense of autonomy, such that they became aware of their ability to choose how to respond to these internal experiences: *“I learnt so much at the retreat. I understand I can retrain my brain and listen to my body’s signals. It is ok have negative thoughts but don’t dwell on them...acknowledge them, put them on a leaf and watch them go, still working on all of this of course”.* Thus, having discovered the power of their own minds, participants reported leaving the Retreat with what appeared to be a stronger belief in the possibility of self-improvement.

6.2.4.2. A Shared Experience. Participants also emphasised the social benefits of the Retreat. They reported that engaging socially with others compensated for negative emotions, such as isolation and loneliness, which previously led to emotional eating. Being in a group setting, participants formed positive social connections which helped to normalise postoperative challenges and increase commitment to personal health goals: *“It was also a great opportunity to meet others who have had bariatric surgery - this was a positive experience for me as it can be quite lonely post-op. It also helped me understand that to err is human, it’s not a reason to give up. Psychologically it made me stronger and better informed to stay on the weight loss journey’.*

Additionally, exposure to other’s struggles with weight regain was cited as motivation to avoid a lapse and remain goal-directed: *“It has helped me connect socially with the WLS community which is very beneficial in stepping out of isolation. Being exposed to participants struggling with regain has made me hyper vigilant to the terror I feel of regaining useful to keep myself accountable.”*

6.2.4.3. Support After the Retreat. Overall, participants seemed to experience the Retreat as a supportive environment that facilitated substantial self-growth in a short space of time (4 days). However, in order to sustain these benefits, some participants felt that they needed to refer to additional resources to *"refresh"* their memory and reinforce their prior learnings: *"I was very motivated when I left the retreat but have found things slip....but I know where I can refresh the techniques"*, *"It was great at the time but I do need to do a refresher of what we did there. Which I think then would be beneficial now."*

7. Discussion of Quantitative Results

7.1. Aims and Scope

This chapter reviews the main findings of the current research. It begins with a return to each of the study's primary hypotheses, discussing whether they were supported and any important clinical implications. The relevance of the findings to the current literature is considered, with emphasis to the contribution this research makes to understanding the efficacy of ACT for bariatric surgery individuals. In closing, limitations of the overarching study as a whole, as well as areas for future research are discussed.

7.2. Revisiting the Primary Hypotheses

7.2.1. Hypothesis 1: Participants in the ACT-based Intervention (FOHL Retreat) will Show Larger Reductions in Weight-related Experiential Avoidance Relative to Controls.

Hypothesis 1 of the present research proposed that participants who attended the Retreat would show greater improvements in weight-related experiential avoidance over time, compared to the control group. A nonsignificant reduction was ascertained in both the Retreat and control groups, although was larger in the Retreat group, as hypothesised. However, there was insufficient variability detected in the rate of change between groups and thus, the null hypothesis could not be rejected. As such, based on the multilevel model, there is insufficient evidence to suggest that the Retreat improves weight-related experiential avoidance to a greater extent than controls.

However, supplementary analyses including a mixed ANOVA and independent samples t-tests indicated a significant decrease in weight-related experiential avoidance (AAQW) scores from baseline to follow-up in the Retreat group, in accordance with Hypothesis 1. It is possible that the disparity in findings between the primary and supplementary analyses may reflect the implicit control for regression to the mean in the multilevel model which is not accounted for in the RM ANOVA. This is plausible given the Retreat group started with higher baseline scores on the AAQW (8 units higher than the control condition) which reduced by 10 units to the same score as the control condition at follow-up. Due to discrepant findings between the primary and supplementary analyses, we cannot conclude with confidence that the Retreat was associated with significant improvement among participants. Thus, prospective studies are required to more clearly determine the impact of the Retreat on weight-related experiential avoidance.

7.2.1.1. Comparison to Existing Literature. These findings stand in contrast with those from prior research using ACT with bariatric surgery individuals. Weineland et al., (2012a; 2012b) implemented a mixed delivery format ACT protocol with a sample of 19 randomly assigned post-bariatric surgery individuals in Sweden. Results were compared to those of a treatment as usual (TAU) control group (*n* = 20) who continued receiving standard post-operative medical care. The researchers found large and significant improvements in pre-to-post change in weight-related experiential avoidance in the ACT condition (*es* = 1.19), and from pre-to-follow-up (*es* = 0.80). Those in the TAU condition did not improve significantly from pre-to-post (*es* = .07) or pre-to-follow-up (*es* = .12). Comparisons between conditions on pre to post changes were largely significant, while the differences between pre-to-follow-up changes were medium and marginally significant.

This raises the question: Why were these effects not found in the present study, despite both targeting the same population? Consideration to methodological differences between the studies provide potential hypotheses for future research to explore. Weineland et al.'s studies (2012a; 2012b) included a greater post-surgery timeframe ranging between 4 and 30 months (3.2 years). The less time that has passed since surgery, the more difficult it is to discern the effects of the surgery from those of ACT on changes in weight-related experiential avoidance. The effects of surgery typically dissipate over time, while most individuals continue to experience strong surgical effects (e.g. weight loss, muted hunger cues, absence of cravings) 4 months postoperative (Canetti et al., 2016; Courcoulas et al., 2018; Sarwer et al., 2008). This could mean that changes in weight-related experiential avoidance scores for those at the lower end of this post-operative time range may reflect the fact that ongoing weight loss makes it easier to detach from negative weight-related thoughts and feelings. Those continuing to experience weight loss may have found it easier to cognitively refute negative self-beliefs about their weight, as opposed to practicing acceptance of these. Alternatively, weight-related experiential acceptance may be more easily promoted among individuals already experiencing positive change, as is more likely to be the case for those earlier in their post-operative journeys.

Differences in the outcomes between studies may also be partly explained by statistical analysis methods. Weineland et al. (2012a; 2012b) utilised repeated measures ANOVA which precludes direct comparison to the multilevel models in our research. The results of our mixed ANOVA substantiated Weineland et al.'s (2012; 2012b) findings albeit with much smaller effect sizes, as the Retreat group displayed significant improvement in weight-related experiential avoidance from baseline to post-treatment and from baseline to follow-up. Average weight-related experiential avoidance scores at baseline and post-intervention were remarkably similar between both studies, while a similar pattern of change over time occurred as pre to post-intervention decreases were followed by a slight increase at follow-up.

7.2.1.2. Intervention Components. The present study's findings for Hypothesis 1 may be partly attributed to unique intervention components within the FOHL Retreat. Although, ACT has been previously applied and adapted in the weight-loss surgery population (Weineland et al., 2012a; Weineland et al., 2012b), this study is the first to evaluate the FOHL Retreat for a post-bariatric population in New Zealand. Similar to previous ACT programmes for individuals with chronic weight difficulties, the FOHL Retreat represents its own version of an ACT-informed intervention developed by professionals specialising with the bariatric surgery population.

The Retreat aims to enhance the overall health and wellbeing of participants by promoting psychological flexibility using the six main processes of ACT; acceptance, mindfulness, defusion, self-as-context, commitment, and values (Hayes et al., 1999). These components were targeted with particular emphasis on participants' shared goal of sustaining postoperative health outcomes. Thus, behavioural strategies and practical skills regarding food and weight-management were integrated to meet the practical support needs of participants. Strategies typically unrelated to ACT included self-monitoring of exercise and food intake, portion control, nutritional advice and exercise ideas designed to support participants make healthy lifestyle adjustments to maintain their post-operative outcomes.

There is mixed debate surrounding the effectiveness of combined therapeutic approaches to weight management programmes, and more research is needed to draw firm conclusions. It is possible that integrating behavioural components has the potential to dilute the effects of ACT on psychological flexibility, or create ambiguity around intervention goals (Forman et al., 2016; Lillis & Kendra, 2014).

Philosophical differences between the two treatment approaches may be a hypothetical cause for confusion, as behavioural strategies for weight control may, at least on the surface, appear to reinforce experiential avoidance (Lillis & Kendra, 2014). It could be argued that weight monitoring and diet/exercise plans in pursuit of weight loss or maintenance reinforces experiential avoidance and thus contradicts ACT's overarching aim of promoting acceptance. However, in the context of the present sample, it can be assumed that weight loss and maintenance forms an integral part of values-based goals post-surgery.

Both ACT and behavioural-based principles in the Retreat shared the same message. All skills and strategies for weight management aimed to encourage positive engagement in healthful living, as a means to foster personal values as opposed to avoidance. Within this context, behavioural strategies are incorporated within an ACT framework and are therefore unlikely to reinforce experiential avoidance. Indeed, if the behavioural changes enacted by participants are motivated by their desire to resolve negative self-judgment, this may foster an avoidance agenda that is likely to be ineffective in the long term (Lillis & Kendra, 2014). Alternatively, greater success is likely to come from behavioural changes that are motivated by people's values, such as spending time with family, or maintaining good health. The Retreat supports this approach, by encouraging participants to reflect on their motivations for enacting behaviour change in the context of their personal values. Thus, the inclusion of behavioural strategies in the Retreat is not inherently contradictory to ACT principles and may serve to compliment acceptance strategies, as found in a previous acceptance and behavioural programme (Juarascio et al., 2017).

Relatedly, future research should consider how an integrative therapeutic approach may compare to a single, more generalised approach. While the small yet nonsignificant reduction in weight-related experiential avoidance observed in Retreat participants relative to controls lends support to the use of behavioural strategies within an acceptance-based framework, principles taken from other evidence-based therapeutic modalities may also offer benefit to the weight-loss surgery population. For example, distress tolerance (a core component of DBT; Linehan, 2015), has been associated with greater reductions in experiential avoidance for individuals with eating concerns (Delparte et al., 2019). This association is supported by previous research which found the relationship between experiential avoidance and eating disinhibition was explained by expectations that eating would alleviate distress (Schaumberg et al., 2016). Thus, distress tolerance may be a building block of psychological flexibility.

When a person experiences intense negative emotions or thoughts without the ability to tolerate or accept these, they are likely to be too preoccupied with avoiding the experience and in turn, psychologically unavailable to respond flexibly with an open and receptive attitude (Kashdan, 2010). Hence, integrating distress tolerance into the Retreat programme may increase participants' capacity tolerate internal discomfort and improve psychological flexibility.

7.2.1.3. Delivery Format. Failure to observe significant improvements in weight-related experiential avoidance at follow-up may be in part, explained by the format in which the intervention was delivered. Previous studies have found shorter ACT programmes delivered over a longer time period were efficacious in producing positive psychological outcomes that were maintained after 3 months (Weineland et al., 2012a). This could be explained by the spacing effect; the notion that learning – be it facts, concepts, or skills, is enhanced when spaced apart in time, as opposed to massed in immediate succession (Vlach & Sandhofer, 2012). This is a highly replicable and robust effect proven persistent across timescales and development. Studies have shown spaced learning can promote both simple and complex skills generalisation by supporting the abstraction of relevant information that is likely reactivated in memory in subsequent learning sessions (Vlach & Sandhofer, 2012). Thus, although information is forgotten over time, spaced learning increases the likelihood that the underlying abstract structure or concepts related to the learning are retained and generalised. This is of relevance to ACT-based programmes like the FOHL Retreat, as psychological flexibility is both a dynamic and abstract construct. The ongoing benefit of the Retreat also relies on participants generalising the principles of ACT into their lives according to their unique and personally chosen valued directions.

In light of these points, it is possible that delivering the Retreat programme over a longer and spaced period of time may extend follow-up outcomes. This would give participants more time to process, consolidate, apply, and generalise new skills, which may be particularly useful when targeting relatively stable and rigid internal processes such as experiential avoidance. Previous research supports this notion, including one study which found mindfulness, a key skill directly related to psychological flexibility, only surfaced as a potential mediator of weight loss six months after the end of an ACT intervention for weight-loss (Forman et al., 2009).

Improving weight-related psychological flexibility is undoubtedly a dynamic process underpinned by multiple psychological processes that develop experientially. These include reconfiguring mental resources to balance awareness, acceptance and receptivity to potentially negative experiences and tolerate associated discomfort (Kashdan, 2010). Thus, individuals must find ways to apply ACT skills such as mindfulness, defusion, and acceptance to shape their default mindsets in a more flexible direction. Given the complexity of adjusting embedded information processing and behaviour patterns that maintain experiential avoidance, three months could be too early a timeframe to reasonably expect significant changes to weight-related experiential avoidance. Hence, measuring this at multiple time points over a larger timeframe would provide a better indication of how the Retreat affects experiential avoidance. Additionally, though the Acceptance and Action Questionnaire for Weight-Related Concerns (AAQW) has been widely used as a self-report scale of weight-related psychological flexibility, it is undeniably limited in its ability to capture the extent to which the Retreat successfully targeted correlates, antecedents, and consequences of psychological flexibility (Kashdan. 2010).

7.2.1.4. Facilitator Variables. Though the Retreat programme was developed by a clinical psychologist with expertise in ACT, they were not involved in programme delivery. Instead, Retreat facilitators were those with expertise in bariatric surgery, acquired either professionally (e.g. surgeon, nurse) or via lived experience. It is unclear how this may have affected treatment fidelity, as the majority of studies investigating ACT typically include a psychologist trained in ACT (Forman et al., 2016; Lillis et al., 2009; Weineland et al., 2012a, 2012b).

With varying qualifications and training backgrounds, familiarity with ACT likely differed between facilitators. Some may have greater understanding of its theoretical underpinnings while others may be more knowledgeable about its practical implementation. In this context, it is important to consider how variation among facilitators may influence treatment fidelity whilst pointing out that this is not exclusive to the current study and inevitably exists between all programme facilitators. However, variability may be partly mitigated when facilitators share professional training backgrounds as in Weineland et al.'s study (2012a). This is important to keep in mind when interpreting the current findings, and may be particularly relevant to weight-related experiential avoidance as the main ACT process of change.

7.2.2. Hypotheses 2 - 4: Participants who Receive the ACT-based Intervention (FOHL Retreat) will Show Larger Reductions in Disordered Eating Relative to Controls, Specifically, both Uncontrolled Eating and Emotional Eating.

As hypothesised, the results of the multilevel model demonstrated significantly larger improvements in disordered eating in the Retreat group relative to controls. This was corroborated by the findings of the mixed ANOVA which suggested these effects were short term as significance of improvement did not extend to follow-up. Thus, while significant improvement was observed, further investigation is required to confidently infer the longevity of these improvements.

This finding is noteworthy, as disordered eating is highly prevalent in pre-bariatric surgery populations, which is of concern given its association with poorer surgical outcomes (van Hout et al., 2006). This includes binge eating, overeating, loss of control over eating irrespective of quantity, and emotional eating (Cella et al., 2019; Colles et al., 2008; Conceição et al., 2014a, 2014b), all of which increase the risk of postoperative weight regain (Bryant et al.,, 2020). Hence, the present findings support the Retreat as an effective means of addressing the continuation of pre-existing disordered eating habits in the post-bariatric surgery population, which has the potential to reduce the risk of poor follow-up outcomes.

Our results corroborate the majority of existing research in this area. Studies have repeatedly demonstrated ACT and ACT-behavioural based interventions effectively address disordered eating patterns in overweight populations (Tapper et al., 2009; Lillis et al., 2009; Lillis et al., 2016; Forman et al., 2013; Katterman et al., 2014; Niemeier et al., 2012; Weineland et al., 2012a; 2012b).

Lillis et al. (2016) investigated outcomes of an ACT-based behavioural intervention relative to a standard behavioural treatment for a group of 162 overweight and obese adults with high levels of disinhibited eating patterns. Over 24 months, greater changes in internal disinhibition were observed in the acceptance-based behavioural intervention group. Internal disinhibition was measured using items from the original TFEQ that comprise the emotional eating subscale of the TFEQ-R18. Hence, comparisons between these outcomes can be made irrespective of differences in the way the eating domains were conceptualised.

The differential impact of the acceptance-based intervention between groups was largest between 18 and 24 months in Lillis et al.'s (2016) study. This raises the question of how the Retreat, as a similar ACT and behavioural-based intervention, affects eating behaviour over the same time period. This warrants a longer follow-up period than used in the current study, which may also provide some indication of the average point at which eating patterns stabilise. This may be particularly helpful information for participants, as many worry about when their postoperative eating habits will stabilise given their long histories of unstable eating patterns.

7.2.2.1. Emotional Eating and Uncontrolled Eating as Separate Outcomes. When emotional eating and uncontrolled eating were modelled separately, no significant between-group differences were observed. However, small, nonsignificant changes in the predicted direction (decreases) were found in the Retreat group, while slight increases in both uncontrolled and emotional eating were observed in the control group. The Retreat group reductions were larger for uncontrolled eating relative to emotional eating. These results are difficult to place in existing literature, as few studies have distinguished between emotional and uncontrolled eating with most measuring a combination of the two, often defined as disinhibition (Lillis et al., 2016). Thus, measuring these two concepts separately presents a distinct contribution to the bariatric surgery literature.

The absence of significant between-group differences in emotional eating and uncontrolled eating when measured separately, may be partly explained by the following methodological considerations. Firstly, it should be noted that the measure of emotional eating only contained three items in response to three emotions; sadness, loneliness and anxiety. This is the minimum number of scale items recommended when developing a psychometric scale, though including more items is advisable in order to increase scale reliability and capture the richness of the measured variable (Robinson, 2017). The three emotional eating items in the scale fail to capture the wide array of emotions that may trigger individuals to eat (including positive emotions), which may have compromised the validity of our results. Furthermore, these items measured eating *behaviour* only, as opposed to urges to eat in response to emotions. As behaviour change is not a direct target of ACT, only including *behavioural* emotional eating outcomes leaves the potential for indirect influences of the Retreat on emotional eating to be missed.

Conversely, uncontrolled eating items measured both internal experiences such as thoughts and feelings, in addition to behaviours related to overeating such as stocking up on food and temptation. It is possible the larger decrease observed in uncontrolled eating scores relative to emotional eating scores in the Retreat group suggests the Retreat produced change by decreasing the presence of thoughts and feelings that underpin overeating. However, ACT theory posits its effectiveness is not reflected in its ability to remove thoughts and feelings related to uncontrolled eating, but rather in its ability to promote *acceptance* of these internal experiences and values-driven behaviour in their presence (Hayes et al., 2006). Unfortunately, the uncontrolled eating items assess the *presence* of thoughts and feelings making it difficult to draw conclusions about the degree of acceptance individuals may have felt towards their internal experiences. To more accurately evaluate the effectiveness of ACT in accordance with its true aims, the development of an alternative eating measure that captures *acceptance* of internal experiences related to food is likely required.

The larger interaction effect for uncontrolled eating relative to emotional eating may also be attributable to the combined effects of surgery and the Retreat. Reductions in episodes of uncontrolled eating is a well-known and expected outcome of bariatric surgery given the dramatic changes in physiological capacity of ingestion and digestion it imposes. Consequently, individuals are physically unable to consume the same amount of food in one sitting (at least for a period of time) postoperatively (Conceição et al., 2015). The unpleasant effects of overeating postoperatively may result in negative reinforcement expectancies, such as the belief that overeating will make one feel worse, cause further discomfort, or induce fears of weight gain.

In contrast, emotional eating may not invoke the same level of physiological discomfort as uncontrolled eating, and consequently may not trigger the same degree of negative outcome expectancies associated with overeating. In this way, emotional eating may be less impacted by surgical effects relative to uncontrolled eating habits, and therefore it is important emotional eating is addressed in follow-up care. One way for the Retreat to more effectively target emotional eating could be through exploring participants' eating expectancies with the aim to facilitate their reappraisal from a long-term values-based perspective. This could decrease the negative reinforcement of emotional eating and in turn, increase motivation to use eating regulation strategies that improves treatment response (Schaumberg et al., 2016b).

7.2.2.2. Emotional Eating and Uncontrolled Eating in the Context of ACT. Currently, there appears to be more research supporting the efficacy of ACT-based techniques in reducing problematic eating behaviours characterised by a loss of control (uncontrolled eating, overeating, binge eating), in comparison to emotional eating. This provides one plausible explanation for the greater changes observed in uncontrolled eating relative to emotional eating. For example, mindfulness training (one of the six ACT processes) has proven to be effective in reducing impulsive eating and binge eating in adults with overweight and obesity (Ruffault et al., 2017). The Retreat facilitated mindfulness practice with the aim of increasing awareness of bodily hunger and satiety to guide eating. Greater awareness of these cues reduces the likelihood for mindless eating that many people experience during uncontrolled eating episodes. Other benefits include slowing down food consumption during mealtimes, increasing perceived control over eating, and interrupting automatic external influences of eating (Gerweck & Celentano, 2015; Lofgren, 2015).

With regards to emotional eating, previous mindfulness-based interventions have been shown to decrease (Alberts et al., 2012; Daubenmier et al., 2012; Katterman et al., 2014) or to have no effect (Tapper et al., 2009) on this construct, when defined as eating in response to negative emotions. Our results match those of Timmerman and Brown (2012), who similarly failed to elicit significant improvements in emotional eating when evaluating the impact of mindfulness exercises on a sample of 19 participants with weight management issues. Mindful eating practices were facilitated and largely focused on expanding awareness of internal cues (i.e. hunger, satiety) whilst eating. Facilitators also encouraged mindfulness of the sight, smell, and food textures with an aim to enhance satisfaction derived from eating. After six 2-hour sessions, no significant differences were found between the intervention and control group. Conversely, a separate study utilising mindfulness of emotions practices, as opposed to mindful eating, demonstrated reductions in emotional overeating behaviour (Niemeier et al., 2012).

These results suggest that both mindful eating exercises and emotionally focused mindfulness practices can benefit individuals with disordered eating. Thus, while many programmes for those seeking weight management (including the Retreat) typically teach mindfulness as a tool for eating, applying mindfulness to emotions may offer additional benefit, especially for those with high levels of experiential avoidance, as evidenced by the current sample and throughout obesity and eating disorder literature (Harrison et al., 2009; Svaldi et al., 2012b). However, those with high levels of emotional intolerance may struggle to engage in emotional mindfulness, as this involves bringing emotions into full awareness without engaging in automatic responses or efforts to change them. Doing so requires individuals have some capacity to tolerate distress associated with their internal experiences. While emotional tolerance was not specifically measured in our sample, it is reasonable to assume this was an issue in our sample given the comparatively high levels of emotional eating observed, almost doubling that of previous samples of overweight individuals, those struggling with disordered eating, and a bariatric surgery population (Albert et al., 2012; Karlsson et al., 2000; Laurenius et al., 2012). This is further suggested by a wealth of prior literature showing poor emotion regulation, high levels of emotional intensity, and low emotional acceptance are typically prominent across individuals with disordered eating (Harrison et al., 2009; Svaldi et al., 2012b).

7.2.2.3. Enhancing Eating Behaviour Outcomes. In light of these points, it is possible that including distress tolerance techniques into the Retreat (as prior suggested in section 7.2.1.2 for improving experiential avoidance) may increase participants' capacity and willingness to engage in mindfulness practices and increase their potential to positively affect emotional eating. One way of achieving this could be through integrating skills from other third-wave therapies, such as dialectical-behaviour therapy (DBT; Linehan, 2015) into the Retreat programme. DBT is largely efficacious in addressing disordered eating patterns, including both binge eating and emotional eating in a pre-bariatric surgery population (Delparte et al., 2019). It does so by effectively targeting both distress tolerance and emotion regulation; two constructs rarely distinguished in ACT interventions despite being conceptually different. Emotion regulation promotes awareness and understanding of internal experiences which in turn, may reduce frequency of episodes of heightened distress (Linehan, 2015). Arguably, the Retreat already targets emotion regulation via several modules including mindfulness, working through triggers, and stress management, all of which cultivate awareness of internal sensations and reduce habitual reactivity (Kristeller et al., 2014).

Distress tolerance on the other hand, refers to one's ability to cope with difficult emotions as they occur (Linehan, 2015). Distress tolerance skills are designed to target in-the-moment distress when capacity for self-regulation is limited and thus, may be particularly useful for individuals with high emotional intensity. As such, including skills such as breathing, progressive muscle relaxation, intensive exercise, and temperature control in the Retreat programme (alongside the aforementioned emotion regulation skills) may be one way to enhance eating outcomes.

7.2.3. Hypothesis 5: Participants who Receive the ACT-based Intervention (FOHL Retreat) will Show Larger Decreases in Body Mass Index Relative to Controls.

Our findings indicate the Retreat had a significant impact on improving BMI compared to the control group, corroborating previous research in this area (Forman et al., 2009; Forman et al., 2016; Lillis et al., 2009; Weineland et al., 2012a; 2012b). Individuals with higher BMIs showed greater weight-loss over time and weight-loss continued from post-treatment to three months follow-up. To our knowledge, these results were rarely found in previous literature investigating brief interventions and thus reflect a unique strength of the FOHL Retreat. Lastly, this finding was strengthened by a sensitivity analysis demonstrating the observed effect size was robust when the influence of time since weight-loss surgery was controlled for.

While it is hypothesised that for the majority of individuals in the sample weight-loss constituted a positive outcome, it is unclear what portion of participants continued to seek weight-loss compared to weight management at the time of their Retreat attendance. Nevertheless, these findings are particularly noteworthy, as postoperative weight regain is arguably the most common struggle individuals confront after surgery.

Similar results were obtained in Lillis and colleagues' (2009) randomised controlled trial involving a sample of individuals with obesity. Intervention participants attended a one-day ACT workshop compared to a wait-list control condition. As in our study, weight-loss was not identified as a primary goal, yet results showed several positive outcomes favouring ACT, including significantly improved weight-loss at 3 months follow-up in the ACT group. However, all participants had completed at least six months of a structured weight loss intervention in the preceding two years, which may have confounded results. On this basis, it could be argued that the validity of the present study's results is superior to that of Lillis et al.'s study (2009), as those who had prior participated in the Retreat or another weight-loss focused programme over the data collection period were excluded, thus limiting the presence of confounding variables. Collectively, these results lend support to the efficacy of short and compact versions of ACT interventions in producing weight loss, without a priori weight-loss goals included as a key aim.

The Retreat's effect on BMI also compares favourably to other ACT-based programmes that were longer in duration and specifically targeted weight control. For example, in Tapper et al.'s (2009) randomised controlled trial of 62 females with obesity, more weight-loss in the ACT intervention group was observed comparative to controls, yet change was non-significant. Alongside following their own weight loss plans, participants assigned to the ACT intervention attended 4, 2-hour weekly sessions with the final session delivered at 3 months. Key ACT intervention components were adapted to target weight loss and included values, cognitive defusion, acceptance, and mindfulness, as in the Retreat. Dietary advice and behavioural strategies were avoided.

In a previous systematic review of mindfulness meditation programs for eating disturbances and weight control, small weight decreases were cited only in studies where weight-loss was a primary aim and included nutritional education alone, or in combination with behavioural weight loss strategies such as exercise plans (Dalen et al., 2010; Katterman et al., 2014; Miller et al., 2012; Timmerman & Brown, 2012). Moreover, these weight decreases were superseded by those observed in the Retreat group (Dalen et al., 2010; Miller et al., 2012; Timmerman & Brown, 2012). Results across the remainder of studies were nonsignificant, with two studies reporting weight gain from baseline to post-treatment and 12-weeks following a mindfulness-based stress reduction programme (Kearney et al., 2012; Rosenzweig et al., 2007), one of which was statistically significant at 24 weeks (Kearney et al., 2012). Taken together, these findings suggest that ACT does not need to directly target weight control in order to positively impact weight, while the benefit of ACT for weight loss likely resides in the combination of its six principles; of which mindfulness is one, but not the only active ingredient of change.

The larger weight-loss observed in the Retreat group may partly reflect the effects of autonomous motivation. This refers to the extent to which an action is personally endorsed and engaged in with a sense of personal choice, as opposed to being associated with a need to comply or with feelings of pressure (Teixeira et al., 2012). Autonomous motivation has been shown to mediate ACT treatment effects on weight-loss (Forman et al., 2013; Forman et al., 2016), while higher autonomous motivation early in ACT treatment has predicted greater total weight loss at 12 months follow-up in previous research (Forman et al., 2016; Webber et al., 2010). Individuals self-select to attend the Retreat which may reflect a greater degree of baseline autonomous motivation relative to the controls in this study. This may have been increased through participating in the Retreat which in turn helped participants sustain weight loss outcomes post-treatment.

It is also plausible the behavioural components included in the Retreat programme may have augmented weight loss outcomes beyond what the ACT principles may have produced alone. Support for this possibility resides in a large body of literature that has demonstrated the efficacy of acceptance-based behavioural interventions (ABBI) for weight management (Forman et al., 2013; Lillis et al., 2013; Lillis et al., 2016; Niemeier et al., 2012; Tapper et al., 2009). ABBI studies have shown positive impacts on weight loss and weight control more consistently than ACT, mindfulness, or standard behavioural treatments alone. This is evident in recent research, with one randomised controlled trial showing greater weight loss in an ABBI condition relative to a standard behavioural weight loss intervention (Forman et al., 2013; Forman et al., 2016). Interestingly, greater weight loss outcomes were observed in Forman et al.'s second study (2016), where the original ABBI protocol was adjusted to increase focus on utilising experiential acceptance in response to internal states, replacing prior focus on practical coping strategies. Given these studies were otherwise methodologically identical, this supports the benefit of targeting ACT specific mechanisms to foster healthy behaviour.

Positive weight outcomes were similarly found in a pilot study of a manualised ABBI treatment for overweight individuals (Niemeier et al., 2012). Multilevel models demonstrated a significant relationship between ABBI and weight decreases over time. No difference in weight-change occurred between the end of treatment and 3 months follow-up, though decreases were maintained. Our study highlights a variation of these results in that observed weight-loss was smaller between baseline and post-treatment yet, the rate of change remained consistent between post-intervention and 3 months-follow-up. The smaller changes in BMI in the present study can be partly explained by the narrow 10 (minimum) to 24 (maximum) day timeframe between baseline and post-treatment measurement points. Taking this into consideration, the BMI decreases over this window of time are promising given early weight-loss in weight-focused interventions predicts longer-term weight-loss (James et al., 2018).

7.2.4. Hypothesis 6: Participants who Receive the ACT-based Intervention (FOHL Retreat) will Show Larger Increases in Flexible Dietary Restraint Relative to Controls.

The current study examined the effect of the Retreat on the flexible dietary restraint subscale of the restraint scale in the original Three Factor Eating Questionnaire (TFEQ; Stunkard & Messick, 1985; Westenhoefer, 1991). There were no significant differences in the rate of change between the Retreat and control group over the measurement period. Both groups began with nearly the same average flexible dietary restraint scores, with the Retreat group improving by approximately two points at follow-up; that is, one unit more than observed in the control group.

It is difficult to place the current study's results in the context of existing literature for several reasons. First, there is a lack of agreement concerning the conceptualisation of restraint in the literature. Unlike in the present study, few studies have consistently distinguished between restraint types as the current study has (with most previous research referring to it as a sole construct), thus presenting a unique contribution to the literature. Consequently, little attention has been given to evaluating the extent to which restraint types can be captured psychometrically and whether it can be reliably measured in the weight-loss surgery population.

Second, there is considerable uncertainty attached to the implications of increases in flexible dietary restraint, as the role of cognitive restraint for healthful eating habits and weight control remains the topic of substantial debate. Lastly, this is the first study to investigate the impact of an ACT-based intervention on flexible dietary restraint in a bariatric surgery population. As a result, uncertainty remains with regards to the ACT mechanisms of action that facilitate changes in restraint. Each of these considerations will be discussed below in light of existing literature.

7.2.4.1. Conceptualising and Measuring Restraint. Dietary restraint is when food intake is intentionally limited for the purpose of weight control or weight loss (Herman & Mack, 1975; Schaumberg et al., 2016a) and is therefore a dieting behaviour. Multiple single factor measures have been developed to capture this concept, with most studies in the obesity literature utilising either the Restraint Scale (Herman & Mack; 1975; Polivy et al., 1978); the Dutch Eating Behaviour Questionnaire (DEBQ; van Strien et al., 1986), or the restraint subscale of the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994). Each were developed in different populations, from a clinical sample of those with Anorexia and Bulimia in the case of the EDE-Q (Fairburn & Beglin, 1994), to a nonclinical sample comprised of individuals of normal weight and overweight for the DEBQ, and individuals of normal weight and with obesity in the case of the Restraint Scale (Herman & Mack, 1975; Polivy et al., 1980). Thus, there exists large conceptual differences between restraint measures which limits the validity of between-measure comparisons, as evidenced by the flexible dietary restraint subscale (developed in an obese population) previously failing to demonstrate a significant correlation with the EDE-Q cognitive restraint subscale (developed in a clinical eating disorder population) (Blomquiest & Grilo, 2011). This makes theoretical sense, as clinical eating disorders such as Anorexia are characterised by pathological levels of restraint associated with poor health outcomes, while restraint in overweight populations may refer to more adaptive forms that predict positive health outcomes. Evidently, these differences emphasise the complex and multidimensional nature of restraint that likely presents differently across clinical populations. The flexible dietary restraint subscale has previously failed to demonstrate a significant correlation with the EDE-Q (Blomquiest & Grilo, 2011).

The restraint scale used in the present study was developed specifically for use in obese populations (Parker, Mitchell, O'Brien, & Brennan, 2015), while measuring *flexible* dietary restraint was particularly relevant given that enhancing cognitive flexibility is integral to ACT. Thus, the selection of this measure represents a unique strength of the study relative to comparative studies of bariatric surgery individuals which have used the EDE-Q (Fairburn & Beglin, 1994); a measure designed to capture eating restraint features of Anorexia and Bulimia, two disorders rarely reported in the bariatric surgery population (Weineland et al., 2012a; 2012b).

Nevertheless, no restraint scale has been validated in a bariatric surgery population as of yet. Until there exists clear markers to delineate between restraint types, it remains unclear the extent to which existing psychometrics, including the one used in this study, are capable of reliably measuring this complex construct. Evidently, further exploration of how restraint presents and functions in this group is a necessary pre-requisite to establishing a more appropriate measurement method.

7.2.4.2. Restraint and ACT. Considering the incongruity between restraint measures, it is unsurprising to find large discrepancies in study outcomes that have investigated ACT's effects on restraint. This study's main findings align with two other studies that investigated the impact of ACT on dietary restraint and similarly found nonsignificant between-group (intervention vs control) differences (Järvelä-Reijonen et al., 2018; Weineland et al., 2012a). One of these studies observed small increases in restraint over 36 weeks (Järvelä-Reijonen et al., 2018), while the other showed small decreases (Weineland et al., 2012a). Yet, in order to understand whether these changes were positive or negative, results must be interpreted with consideration to the psychometric measures used to assess restraint in both studies. Despite different outcomes, it could be argued that both findings posit ACT favourably when attention is paid to the restraint measures used in each study. Järvelä-Reijonen et al. (2018) utilised the cognitive restraint subscale of the TFEQ which measures efforts to regulate food intake and body weight, both of which have been associated with positive health outcomes in overweight populations (James et al., 2018). In contrast, Weineland et al. (2012a) administered the cognitive restraint subscale of the EDE-Q which measures pathological restraint tendencies seen in Anorexia and Bulimia. Taken together, these findings suggest ACT may be efficacious in both enhancing more adaptive forms of restraint, whilst reducing those associated with eating pathology.

In contrast with the findings of our main model, previous studies have demonstrated significant changes in restraint following ACT-based treatments. A single-group preliminary study evaluated the effects of a 12-week ACT-based behavioural intervention on cognitive restraint in a nonclinical sample of overweight individuals (Forman et al., 2009). Authors showed significant increases in cognitive restraint pre- to post-treatment, as measured by the cognitive restraint subscale of the TFEQ yet, this did not extend to follow-up. Conversely, Niemeier and colleagues (2012) reported significant decreases in the same dietary restraint items in a group of individuals with overweight and obesity who completed a 6-month acceptance behavioural based intervention.

7.2.4.3. Increasing Restraint: Productive or Problematic? As mentioned, in the absence of a clear and consistent conceptualisation of restraint, it is difficult to interpret the direction of change observed with benefit or non-benefit and situate our findings in the context of existing literature. Indeed, whether restraint is beneficial or detrimental for weight loss remains a contentious topic of much debate in obesity literature and is far from understood. Hence, the clinical implications of the present flexible restraint findings are unclear.

Restraint theory posits that dieting by exerting restraint is unsustainable in the long term and research has linked restraint to the development of eating psychopathology including binge eating and overeating, and eating disorders (Bryant et al., 2019; Mailloux et al., 2014). This is concerning given the high prevalence of eating disorders among bariatric surgery candidates and the increased risk of disturbed eating after surgery. Conversely, other research has associated restraint with a healthful dietary intake, lower levels of energy consumption (French et al., 2014), lower cravings and preferences for processed foods (Polk et al., 2017), fat intake (Cornelis et al., 2013), and appetite ratings (Smithson & Hill, 2017), all of which comprise behaviours conducive to weight regulation and potential weight-loss (Aguirre et al., 2017; Bernstein et al., 2015). Studies investigating restraint in overweight, obese, pre- and post-bariatric surgery populations have demonstrated inverse relationships between higher levels of restraint and body fat, self-control, and reductions in uncontrolled and emotional eating, while the opposite has been indicated in normal weight individuals and those who have no previous dieting histories (Konttinen et al., 2009; Parker et al., 2015).

Evidence for the relationship between restraint and BMI is conflicting, and proposes that restraint is positively associated with BMI where a higher level of restraint increases obesity risk (Anderson et al., 2016; Blumfield et al., 2018; Cornelis et al., 2013; Porter Starr et al., 2014; Verzijl et al., 2018), restraint is lower in populations with obesity (Jeanes et al., 2017), or entirely unrelated to BMI (Hootman et al., 2018; Iceta et al., 2019). Factors underlying these variations are complex, and may be partially explained by the interaction between restraint and other eating patterns adopted by individuals, diet quality, and whether a flexible or rigid approach to restraint is applied. As studies rarely report both of these restraint subfactors, it is not possible to state this conclusively (Bryant et al., 2019). Taken together, these findings present a complex view of the impact of Restraint and imply its function varies across conditions and populations, particularly between individuals of different weight categories and patterns of eating behaviour.

In view of the high prevalence of disinhibited eating behaviours that exists in the pre-bariatric surgery population, it is realistic to assume some degree of eating restraint is necessary to maintain surgical weight-loss. Hence, understanding the mechanisms that influence whether restraint is helpful or hindering towards post-operative health outcomes is paramount. This study's attempt to do so is reflected in the intentional discernment between restraint subfactors.

Given ACT targets psychological flexibility, it was expected that the Retreat would increase the flexible restraint of its participants which would in turn, improve health outcomes. This is consistent with previous studies investigating the role of restraint and weight control in obese populations (Forman et al., 2009; Teixeira et al., 2010). For example, in a randomised controlled trial evaluating a 30-session, 7-week behavioural group obesity treatment programme, flexible restraint was identified as one of the strongest correlators of sustained weight-loss over a 24 month period (Teixeira et al., 2010). All forms of restraint including cognitive restraint, flexible restraint, and rigid restraint predicted short-term weight loss at 12-months follow-up; however, only flexible restraint predicted longer term weight management at 24 months. Moreover, flexible restraint was a significant, independent mediator of weight change, explaining approximately 35% of the change in weight-loss post-intervention. These findings suggest both rigid and flexible restraint are conducive to weight loss. However, flexible restraint is adaptive in maintaining these losses whilst the positive effect of rigid restraint dissipates over time.

These existing research findings suggest that including both restraint subfactors (flexible and rigid) in this research may have further assisted with the interpretation of results, by indicating the type of restraint exerting the most influence on participants. For instance, it could be hypothesised that the majority of bariatric surgery individuals view rigidity as an integral part of post-operative healthy eating practices and therefore strive to adopt rigid eating habits.

Support for this hypothesis can be found in the following points. Firstly, the qualitative component of this research highlighted the high prevalence of weight stigma present in participants' experiences of daily life. Participants referenced how negative past weight-related experiences stuck in their minds and contributed to intense fears of post-surgery weight regain while many alluded to a lack of self-trust in their ability to manage their postoperative eating practices without clear guidance. These factors may underpin a preference towards following strict dietary rules that offer clarity and structure comparative to more flexible eating practices.

Second, in an obesogenic environment, exercising rigidity continues to be deemed healthy as reinforced by the dieting industry which persistently promotes restrictive eating practices such as intermittent fasting, calorie counting, cutting out food groups (e.g. keto) (Puhl et al., 2018). Individuals with obesity may be most susceptible to internalising these messages, as suggested by the finding that endorsement of restraint was perceived negatively by individuals of 'normal' weight, but not by those in the obese weight category (Ruderman, 1983).

Collectively, these factors suggest that bariatric surgery individuals may be particularly vulnerable to overvaluing restriction post-operatively, despite research showing food rules increase distress, guilt, and fears of weight gain, further perpetuating unhelpful beliefs and behaviours in the weight-loss surgery population (Watson et al., 2020). Comparatively, flexible eating practices may be viewed unfavourably by post-bariatric surgery individuals, which could partly explain the nonsignificant change observed in flexible restraint, as participants may perceive food flexibility in direct conflict with their health goals and therefore aim to adopt more rigid eating habits. If this is the case, addressing these beliefs should be prioritised at the Retreat by increasing emphasis on the importance of more adaptive eating approaches for *sustainable* long-term weight management.

7.2.4.4. Ongoing Gaps in Flexible Dietary Restraint Research. Evidently, in light of conflicting literature and ongoing gaps in research, we cannot yet confidently assert flexible restraint as an adaptive eating approach for people post-bariatric surgery. While previous research has reported links between flexible restraint and positive health outcomes (Smith et al., 1999; Westenhoefer et al., 1999), more recent research has challenged the idea of promoting flexible restraint practices for several reasons (Tylka et al., 2015). First, the relationship between flexible restraint and positive health outcomes is unclear, with some studies showing flexible restraint to be associated with increased levels of disordered eating (Timko & Perone, 2005). Other research depicts mixed results, such as flexible restraint predicting lower levels of problematic eating patterns yet, higher levels of body checking and exercising purely for weight-control (Linardon & Mitchell, 2017). This suggests that despite its positive impacts on eating behaviour, it may not be conducive to optimising wellbeing or preventing extreme body image concerns in the long-term (Tylka et al., 2015).

Second, significant and positive correlations between flexible restraint and rigid restraint have been observed in several studies, raising the question of whether these are distinct styles of eating behaviour (Linardon & Mitchell, 2017; Shearin et al., 1994; Westenhoefer et al., 2013). On a related note, higher levels of flexible and rigid restraint have been associated with higher levels of disordered eating and body image concerns (Linardon & Mitchell, 2017). However, when rigid restraint was controlled for, flexible restraint became unrelated to body image concerns and was a unique predictor of less binge eating and disinhibition, suggesting that its adaptive properties are identified only when its shared variance with rigid restraint is removed (Linardon & Mitchell, 2017). Taken together, these findings reflect significant knowledge gaps in the flexible restraint literature which in turn, makes it difficult to accurately determine the clinical significance of the present results.

7.2.4.5. From Flexible Dietary Restraint to Intuitive Eating. Evidently, the aforementioned knowledge gaps confirm that flexible restraint as a concept (and its implications) are poorly understood. However, it is uncertain whether these knowledge gaps will be filled in the future, as the focus of recent clinical and public health research seems to resemble a move away from restraint as a concept, and towards a growing interest in intuitive eating (Warren et al., 2017).

Intuitive eating refers to eating in accordance with the natural contingencies of an individual's interpretation of their own physiological hunger and satiety cues (Tylka, 2006). The core principle of this eating style is to listen to one's body and allow it to guide when and how much to eat, instead of relying on the environment, emotions, or the rules prescribed by diets. Additional principles include granting oneself unconditional permission to eat and eating to satisfy hunger.

Intuitive eating and ACT appear to be particularly well suited for integration, with shared emphasis on principles of awareness, openness and acceptance to internal experiences. Much like ACT as it pertains to eating behaviour, intuitive eating aims to expand individuals' awareness of their own experiences to guide food choices and increase attention to the emotional and physical sensations experienced while eating. ACT additionally teaches ways to utilise awareness and acceptance to cope more effectively with distressing internal cues. Thus, ACT skills may complement intuitive eating by helping individuals discern eating behaviour from emotional and external triggers, allowing for physiological cues to play a stronger role in regulating food intake (Boucher et al., 2016).

A growing body of literature has posited intuitive eating as an effective treatment approach for individuals with overweight, obesity, eating disorders, and chronic dieting histories (Romano et al., 2018), suggesting it has the potential to similarly benefit the bariatric surgery population. Studies have found an inverse correlation between intuitive eating and eating disorder symptomatology (including emotional eating, overeating, and controlled eating), body shame, and BMI in the general population (Camilleri et al., 2015; Camilleri et al., 2016). It has also been positively correlated with improved body image satisfaction, higher self-esteem, and improved emotional functioning, all of which buffer disordered eating risk (Romano et al., 2018). Though the relationship between intuitive eating and weight loss with individuals with overweight or obesity is less clear, a review of 20 studies evaluating intuitive eating interventions reported weight decreases across 6 studies, weight maintenance in 8 studies, and mixed results in 2 studies (Schaefer & Magnuson, 2014).

The positive health outcomes associated with intuitive eating provide a rationale for future research to explore the influence of intuitive eating practices on post-bariatric surgery health outcomes. Research in this area is scarce, which could be partly due to hesitation around promoting an eating style characterised by granting oneself unconditional permission to eat in a population that often display high levels of overeating pre-surgery. However, if exercising restriction increases the risk of disinhibited eating as theorised (Herman & Polivy, 1984), then applying unconditional permission to eat may prove a more effective alternative in the long term.

The goals of intuitive eating may also appear (at least on the surface) incongruent with those of bariatric surgery, in that intuitive eating addresses why people eat and rejects weight loss as a priority, whilst the benefit-risk balance of bariatric surgery relies on post-surgical weight loss maintenance. Hence, medical after-care typically prioritises weight reduction via behavioural self-monitoring practices such as self-weighing and calorie counting, despite minimal support for their long term efficacy and evidence of their associations with weight cycling, weight stigma, poor mental health and eating pathology (Bacon & Aphramor, 2011; Tylka et al., 2014). These considerations provide reason to revise current practices that primarily focus on weight-loss at the expense of other health outcomes, and explore alternative intervention approaches that support postoperative weight management without causing harm.

To our knowledge, there exists only one cross-sectional study that investigated intuitive eating in the bariatric surgery population (Nogué et al., 2019). In a sample of 401 women post-bariatric surgery, an association was found between an intuitive eating style and greater excess weight loss post-surgery. Unfortunately, the absence of data on food intake, other dimensions of eating behaviour such as emotional eating or restrictive eating, and physical activity prevented authors from concluding whether weight loss was linked to “more intuitive” diets compared to eating restraint. Furthermore, it is possible that successful weight loss reduces concern with dietary restraint.

Nevertheless, its aforementioned benefits suggest intuitive eating could prove to be a more accurate measure of healthy eating behaviour than restraint in the post-bariatric surgery population. Moreover, while a psychometrically strong restraint measure is lacking, a valid and reliable 3 subscale intuitive eating measurement tool already exists; The Intuitive Eating Scale-2 (IES-2; Tylka & Kroon Van Diest, 2013). The IES-2 captures adherence to intuitive eating principles overall and in its 3 clearly distinguished components; Eating for Physical Rather than Emotional Reasons, Reliance on Hunger and Satiety Cues, and Unconditional Permission to Eat (Tylka & Kroon Van Diest, 2013). On this basis, future research efforts focused on elucidating the impacts of intuitive eating, as opposed to flexible restraint, for postoperative bariatric surgery health outcomes is recommended.

7.2.4.6. Summary. Overall, it remains challenging to predict how ACT-based interventions will affect restraint in the bariatric surgery population. While we can conclude the Retreat had a small positive effect on flexible restraint over time, it is not possible to compare this to its impact on rigid restraint, or infer how this result relates to the health outcomes of the sample. Furthermore, as this was the first study to investigate the impact of an ACT-based intervention on flexible dietary restraint in a bariatric surgery population, it remains unclear whether the subfactors can be reliably distinguished and measured in the weight-loss surgery population. Thus, measuring both flexible and rigid restraint over a longer measurement period may provide a better understanding of the relative impact of ACT on the subconstructs of restraint for bariatric surgery individuals. This would likely require the development of a new measure that can distinguish between rigid and flexible restraint, with stronger psychometric properties than the Restraint scale items used in this study. Alternatively, it is recommended that future research explore the role of intuitive eating in the postoperative period, in light of its increasing popularity as a beneficial treatment target in obesity and disordered eating literature (Bacon & Aphramor, 2011; Romano et al., 2018; Schaefer & Magnuson, 2014, Tylka et al., 2014).

7.2.5. Mediation Analyses, Hypothesis 7 and 8: Pre to Follow-up Changes in Disordered Eating and BMI will be Mediated by Pre to Follow-up Changes in Experiential Avoidance.

This is the first quasi-experimental study in New Zealand to examine the processes of change that underlie the medium-term gains produced by ACT for individuals post weight-loss surgery. This is noteworthy, as identifying the relevant mechanisms of action is necessary to refine theory, optimise ACT interventions for this population, and inform future research. Mediation analyses were conducted to determine the effects of weight-related experiential avoidance, as a core mediator in the relationship between the FOHL Retreat, disordered eating, and BMI.

7.2.5.1. Summary of Findings. As hypothesised, pre to follow-up changes in disordered eating and BMI were mediated by pre to follow-up changes in experiential avoidance. Results showed weight-related experiential avoidance fully mediated intervention effects on disordered eating. That is, disordered eating (comprised of both emotional and uncontrolled eating) significantly decreased post-Retreat through changes in experiential avoidance. Given the positive correlation between emotional eating, uncontrolled eating, and BMI, we would expect that these mediational findings would also positively impact weight. Results supported a partial mediation effect, whereby weight-specific experiential avoidance partially mediated the impact of the Retreat on BMI.

The results of our mediation models merit special attention to the efficacy of the Retreat in successfully increasing weight-related psychological flexibility which in turn, positively impacts post-bariatric health outcomes. This suggests the Retreat operates in a manner consistent with the underlying theory of ACT which postulates that increasing psychological flexibility supports successful and sustained health-based living, including healthful eating practices and weight management (Kashdan, 2010). Additionally, findings confirm weight-related experiential avoidance as a key process of change variable in the Retreat, as successful mediation requires a relationship between the process of change and the outcome, whilst controlling for the intervention. Our results support this, as experiential avoidance was identified as a correlate of both disordered eating and BMI, and specifically related to the Retreat.

7.2.5.2. Comparison to Past Literature and Future Recommendations. The present findings are congruent with previous literature between the aforementioned variables (Lillis et al., 2011; Sairanen, 2016) and may be explained by the combined effects of engaging with the ACT specific skills of present-moment awareness, mindfulness, and defusion to support values-based choices. Exercising awareness of internal experiences in real time creates distance between the self and one's thoughts and feelings, thereby interrupting psychological processes, such as thoughts-action fusion, that typically trigger maladaptive eating behaviours. In this way, practicing awareness using ACT techniques including present moment awareness and mindfulness supports individuals to retain control and choice over their behaviours in the presence of uncomfortable internal states (Kristeller & Wolever, 2011). Strategies and skills such as cognitive defusion techniques can then be implemented to help minimise the negative impacts of these internal states and increase opportunity for more values-driven action over time.

The findings from this study's mediation analyses offer preliminary insights into the specific ACT mechanisms that may have underpinned the present study's mediation results. Based on these findings, it is theorised that the value of the Retreat lies within the intervention as a whole being greater than the sum of its parts; an important point to consider in the context of future refinements. Given these theorised effects are purely speculative at this stage, it is recommended that future research further investigate the influence of individual ACT constructs within the Retreat on health outcomes, to determine whether the theorised effects translate into reality.

More specific knowledge of how the Retreat targets psychological flexibility and in turn, eating behaviour and weight may enhance subsequent programme development in a manner that maximises resources and outcomes. This may be particularly beneficial when establishing adjunct options to the Retreat, such as the PACE Programme, for the following reasons. Prioritising Retreat content most integral to creating positive outcome change may mitigate potential limitations associated with the online self-directed nature of the PACE Programme. This would also provide previous Retreat participants ongoing access to the most influential aspects of the Retreat and thus support ongoing development of psychological flexibility. Given that several participants indicated their desire for ongoing access to Retreat resources following attendance, the potential value of this is clear.

7.3. Summary of the Primary Results

In accordance with the primary hypotheses, post-bariatric surgery participants who attended the ACT Retreat showed no significant improvement in weight-related experiential avoidance, and significant improvements in disordered eating and weight-loss at post-treatment. Some improvements in these outcomes were also observed at follow-up, but were not all significant or reliable. No significant increases in flexible restraint were observed in the Retreat group. Finally, weight-related experiential acceptance fully mediated the effect of the Retreat on disordered eating and partially mediated the Retreat's influence on weight-loss. In sum, the ACT intervention utilised in the FOHL Retreat has demonstrated itself as a valuable resource to further support the health-related outcomes of individuals who are post-bariatric surgery, yet further developments are suggested to enhance outcomes.

8. Discussion of Qualitative Results

8.1. Aims and Scope

To better understand the experiences of post-bariatric surgery individuals leading up to, and following their decision to have surgery, three qualitative questions were administered to all study participants using an open text-response format. Focus areas included participants' experiences of their body, food, and eating, in addition to how their relationships to these domains influenced their pre- and post-surgical experiences. An additional question about individuals' experiences of the Retreat was given to Retreat participants with the aim of gaining a more detailed understanding of the Retreat's impacts. Thematic analysis was utilised for each question, from which broad themes were derived.

8.2. Summary of Findings

Results evidenced the significance of food as a coping mechanism to 'deal' with uncomfortable emotions and the connections between weight stigma, negative body image, and problematic eating patterns. Study participants experienced substantial physical health improvements after surgery, which appeared to improve overall quality of life. However, areas of ongoing challenge were evident, such as unresolved eating issues, which fuelled fears of returning to a pre-surgery self and impaired self-confidence in one's ability to maintain surgical weight loss. Retreat participants expressed that they appreciated the social support they felt from other participants and gained greater awareness and understanding about their own internal processes, and how these were implicated in their problematic relationship with food and eating. A desire for ongoing support post-Retreat was shared by multiple participants who felt this would help them continue to apply the skills they learned in their daily lives. When considering these findings, the significance of pre-surgical experiences, the importance of addressing eating disturbances, and the benefit of combining bariatric surgery with psychological intervention were all emphasised.

8.3. Discussion of Themes

8.3.1. Question One: Pre-surgical Experiences of Food, Eating, and Body Image

Previous research performed has identified that individuals seeking bariatric surgery typically have longstanding and complex difficulties with maintaining regular eating patterns and a healthy relationship with food and their bodies (Alegría & Larsen, 2015; Bertoletti et al., 2019; Conceição et al., 2015; Faccio et al., 2016; Thomas et al., 2010). This was corroborated by the themes derived from the first qualitative question that explored pre-surgical relationships with food and weight.

8.3.1.1. Theme 1: Food: Crutch or Foe? This theme reflected the tumultuous nature of participants' relationships with food, characterised by an internal conflict whereby food was viewed as both a source of fear and comfort. For many, it was an emotional coping mechanism driven by experiential avoidance. Food and the act of eating provided temporary stress relief by serving as a form of distraction, or evoking pleasurable feelings. However, most recognised it was ineffective in the long-term, as relief was typically proceeded by negative repercussions including increased distress.

Participants felt stuck between a strong pull towards food and their equally strong desire to avoid it. This conflict is pertinent in the eating disorder and obesity literature, as individuals with disordered eating frequently describe strong preoccupations with food, food-related obsessions, and high levels of food-provoked anxiety (Houben & Jansen, 2019; Natvik et al., 2014). Food-related fear is often concerned with both the threat of potential weight gain from consuming calories, and of losing control and being unable to resist "bad" foods that provoke guilt, shame, and disgust when consumed (Fairburn et al., 2013; Nolan & Jenkins, 2019; Rigby, 2018; Watson et al., 2020). This is supported by several of this study's participants who cited strong feelings of shame, guilt, and self-loathing following perceived overconsumption of "unhealthy" foods, particularly when this behaviour was deemed incongruent with one's personal goals. Consequently, many participants described feeling trapped in a perpetual cycle of food avoidance characterised by restriction and/or dieting, and subsequent overeating, as a result of perceived deprivation. This cycle corroborates that proposed by the transdiagnostic model of eating disorders as reviewed in the literature review section of this study (Fairburn et al., 2013).

Many participants likened their perceived lack of control to an addiction, a comparison that echoes previous qualitative findings (Ogden et al., 2006; Rand et al., 2017). Though uncontrolled eating is a well-known consequence of food restriction, it may also be explained by increased hedonic hunger, that is, persistent thoughts and urges about consuming food in the absence of deprivation (Lowe & Butryn, 2007). Obesity has been associated with a greater tendency towards hedonic hunger, which could be attributed to altered brain reward circuits resulting from overconsumption of highly palatable food (Berridge et al., 2010).

8.3.1.2. Theme Two: Negative Body Image. Participants expressed negative body image through self-critical descriptions of their physical bodies. Shame appeared to permeate participants' accounts of how they experienced their bodies, perpetuated by both current and historical interactions within their interpersonal environments. Childhood trauma and early life experiences of direct weight stigma were of particular import to the development of participants' negative body image. A well-established link exists between childhood weight-related stigma, as experienced by those in this study, and disordered eating (Allison et al., 2007; Greenfield & Marks, 2010). Another study found those with a history of maltreatment in childhood were more than twice as likely to emotionally eat and overeat to cope with stress (Greenfield & Marks, 2010). This was echoed more recently by Salwen and colleagues (2015) who demonstrated weight-related abuse prior to the age of 21, defined by significant verbal victimisation specific to one's weight, was significantly correlated with disordered eating (Salwen et al., 2015).

Several accounts of actual and perceived social stigma were shared by study participants. These interactions negatively impacted body image and reinforced the social importance placed on body size as a measure of value. Internalised weight stigma was evidenced by those who expressed guilt and embarrassment towards their weight, suggesting they felt responsible for their obesity as though it was a choice within their control. This perception is common among individuals with obesity, with estimates from a 2018 study suggesting approximately half of US adults with overweight and obesity experience internalised weight bias (Puhl et al., 2018). It is also unsurprising given the undue emphasis given to personal responsibility arguments of obesity despite a gradual increase of focus on other important contributing factors, such as societal attributions (Puhl et al., 2013).

Negative body image, weight stigma, and associated shame pervade the obesity literature (Puhl & Heuer, 2009). Though body dissatisfaction is considered a normative discontent irrespective of weight status, it is particularly prevalent for those existing in larger bodies where weight stigma, body dissatisfaction, and shame permeates everyday life (Puhl et al., 2013; Stewart et al., 2010; Weinberger et al., 2017). In particular, evidence indicates particularly high body image concerns among individuals seeking treatment for obesity relative to individuals with obesity who are not (Vieira et al., 2012). Our results also align with those of other studies that have explored the pre-surgical experiences of bariatric surgery candidates living with obesity (Ivezaj & Grilo, 2018; Ogden et al., 2006; Stewart et al., 2010).

The prevalence of societal weight stigmatising attitudes is inextricably linked to diet culture and a moral imperative to obtain and maintain the ‘ideal’ body standard (Puhl & Heuer, 2009). This ideal, characterised by overvaluing slenderness, exercises huge influence on the way individuals evaluate their physical appearance and in turn, their value (Weinberger et al., 2017). For example, slenderness is generally linked with being selfdisciplined and in control, qualities that participants in the present study strived to obtain (Weinberger et al., 2017). Individuals unable, or unwilling, to conform to this standard face substantial stigma and prejudice expressed in various forms, from overt discriminatory comments to anti-fat bias sentiments such as media messages pushing weight-loss. This invokes feelings of blame, shame, and inadequacy, all of which were referenced by this study's participants and serve to perpetuate negative body image (Puhl et al., 2013).

There was variability across participants' experiences of their discomfort towards existing in larger, stigmatised bodies. Some felt "trapped" in their bodies while others felt disconnected from their physical selves and the stereotypes associated with their body size. This was exemplified by one participant who felt generally unaware of their own weight unless confronted by the mirror or photos of themselves. While this may reflect active efforts to avoid discomfort, it could alternatively suggest subconscious avoidance through dissociation from one's body - an experience other individuals with obesity have highlighted in prior research (Ogden & Clementi, 2010).

Disconnection was also emphasised through a discrepant self-image, an incongruence between the perceived self and the objective reality of a larger self. This was evidenced by one participant describing themselves "an obese person who acted thinner," their response indicating awareness and internalisation of the aforementioned weight-based identity stereotypes. Interestingly, previous research of bariatric surgery individuals has documented self-image discrepancies in the opposite direction, such that individuals continue to perceive themselves within a 'fat identity' paradigm despite their objectively smaller postoperative bodies (Alegría & Larson, 2015).

Festinger's (1962) theory of cognitive dissonance offers a potential explanation for these discrepancies. Festinger (1962) posits that discrepancies among beliefs, attitudes, or actions causes discomfort that individuals attempt to eliminate by changing. The incongruence participants experienced between their physical body and self-perception could reflect efforts to adjust internalised and self-directed weight-stigma, as a way to protect oneself from the self-judgment associated with an obese identity. While it is unclear whether this was the case, cognitive dissonance has been previously raised as an effective intervention for reducing obesity stigma, suggesting this may have been an adaptive coping strategy for those in the present study (Ciao & Latner, 2011).

The expansive and harmful effects of weight stigma and negative body image were emphasised. Participants shared several experiences of social injustice, unfair treatment, and impaired quality of life, the health impacts of which cannot be overstated. Several psychological and life domains were adversely impacted (including participants' self-confidence, self-esteem, emotional wellbeing, and close interpersonal relationships), leading individuals away from values-based behaviours by increasing avoidance of exercise, socialisation, and quality time with family. These findings are further supported by comprehensive international reviews of research documenting bias and stigma towards obese persons and the several adverse consequences for those affected (Puhl & Heuer, 2009; Rubino et al., 2020). This includes, but is not limited to, poor mental health such as increased depressive symptoms, higher anxiety levels, social isolation, perceived stress, lower self-esteem, and increase avoidance of stigmatising environments, which extends to a majority of public spaces (Hunger et al., 2015; Tomiyama et al., 2018).

Critically, several studies including experimental designs, show weight-based discrimination increases negative self-perceptions, unhealthy eating and weight control behaviours including unhealthy dieting, binge eating and emotional overeating (Fairburn et al., 2003; Grilo et al., 2005; Major et al., 2014; Schvey et al., 2011; Vartanian & Porter, 2016). Additionally, Puhl and Suh's (2015) systematic review of health consequences of weight stigma found associations between weight stigma, higher food consumption and binge eating, lower levels of physical activity, and longitudinal evidence of obesity and increased weight gain over time. These findings were reflected in randomised controlled trials comparing exposure to weight stigmatising content versus neutral content (Brochu & Dovidio, 2014; Chao et al., 2012; Major et al., 2014; Schvey et al., 2011).

Despite these adversities, there remains a perception that stigmatising individuals with obesity may motivate engagement in healthy behaviours to avoid the discomfort of being stigmatised and sitting outside of socially acceptable "norms." Yet, evidently research persistently refutes this notion while obesity rates continue to increase alongside more individuals with obesity reporting weight-based discrimination (Puhl & Heuer, 2010).

Another concerning yet common finding lies in the stigma this study's participants experienced in their encounters with the healthcare system. This corroborates prior findings, including a recent scoping review that demonstrated the systematic and pervasive nature of weight bias and its prevalence among medical health professionals (Alberga et al., 2019; Berg, 2020). Given that judgement from others is a well-established deterrent to help seeking behaviour, this likely increased reluctance to engage with primary health care services potentially delaying access to necessary support (Puhl & Heuer, 2010).

8.3.1.3. Theme Three: The Dieting Dilemma. Pre-surgical eating patterns were marked by long histories of dieting for weight-loss. Participants reflected on their view of dieting as a viable solution to their poor body image whilst identifying this marked the beginning of their painful journeys with weight cycling, dysfunctional eating patterns, and increased psychological distress resulting from perceived dieting failures. This supports a number of studies consistently demonstrating that poor body image increases the likelihood of engaging in unhealthy eating behaviours which exacerbate obesity (Puhl & Heuer, 2009). Repeated engagement in successive diets despite no evidence of their long-term success could be explained by a combination of several factors. This includes previous weight loss success from dieting, perceived lack of alternative options, and the over-attribution of personal responsibility for previous dieting failures (Buchanan & Sheffield, 2015). While the latter may deter some from future dieting, for those with low self-efficacy, self-worth may be derived from their ability to adhere to their diets. In this way, re-engagement in dieting may be viewed as an opportunity to perceive themselves more positively, by restoring a sense of control, persistence, and success to replace feelings of perceived failure (Buchanan & Sheffield, 2015; Leske et al.,2012).

8.3.1.4. Theme Four: Physical Health Motivations. Interestingly, despite bariatric surgery being a medical health intervention, the majority of participants focused on appearance-related and psychological concerns in their pre-surgical reflections. This parallels previous findings that similarly denote the significance of body image as a strong motivating factor for bariatric surgery (Cohn et al., 2019; Libeton et al., 2004; Pearl et al., 2019; Wee et al., 2006). However, the emphasis on body image in the present study does not necessarily indicate the primacy of appearance-related motivations for seeking surgery, and may more accurately reflect the wording of the qualitative question which did not specifically inquire about motivations for surgery but rather explored individuals pre-surgical *experiences* of their bodies, food, and eating.

While physical health and medical health concerns were discussed by participants to a lesser extent, these concerns were clearly cited as key motivators for surgery. Diabetes, heightened risk of cardiovascular issues and shortened life expectancy were all deemed influential to individuals' decision to seek weight-loss surgery. Others cited general physical implications of excess weight that impacted upon quality of life, such as being unable to participate in activities with one's children and family. This aligns with prior work investigating patient motivations for surgery that have consistently highlighted physical health as a primary reason (Cohn et al., 2019; Libeton et al., 2004; Pearl et al., 2019; Wee et al., 2006).

8.3.2. Question Two: Bariatric Surgery Impacts

Participants described an extensive array of positive health impacts from their surgeries across several domains of wellbeing including physical health, psychological health, and quality of life. These will be discussed below in subsections that correspond to the identified themes.

8.3.2.1. Theme One: Improved Physical Health. The physical impacts of weight loss surgery were considerable and immediate. For many participants, surgery resolved pre-surgical medical issues and through doing so, improved perceived quality of life. Greater functional ability post-surgery led individuals to engage in more active and unrestrained lifestyles. Such improvements have been consistently depicted in existing work exploring outcomes post-surgery (Ogden et al., 2006; Sarwer et al., 2008; Sarwer et al., 2010; Sjöström et al., 2004). Critically, these outcomes are particularly favourable given their alignment with participants' core motivations for seeking surgery.

8.3.2.2. Theme Two: The New Self. Alongside physical changes came powerful shifts in self-concept, perceived social acceptance, and engagement in daily life. Surgery appeared to significantly improve body image; a finding typically observed in weight-loss surgery research (Bertoletti et al., 2019). While no overt links were made by participants in the current study, evidence suggests this may have been directly attributed to weight loss, decreased eating disturbances, and reduced stigmatisation, all of which have previously been associated with improved body-image evaluation (Conceição et al., 2014; Friedman et al., 2008; Rosenberger et al., 2007). For some, surgery resembled a starting point of self-actualisation. It appeared to facilitate change in the way individuals experienced their bodies and personal identity, with participants describing greater congruence between self-perceptions and their objective appearance. Relatedly, surgery created a sense of physical and psychological freedom and motivation for people to pursue new skills and interests, and led to gains in self-confidence and self-esteem, as similarly found in earlier research (Bocchieri et al., 2002a, 2002b).

Participants similarly noticed a dramatic increase in their perceptions of social-acceptance and vocational gains post-surgery. Individuals felt reinforced for their weight-loss resulting in an increased sense of belonging and participation in daily life. Some reflected the bittersweet nature of noticing positive changes in the way others reacted to them as they lost weight. They discussed feeling less judged, more heard and valued, which brought both a sense of relief and confidence, yet simultaneously reinforced feelings of objectification. These mixed feelings towards the social impacts of weight loss corroborate those of earlier work (Hawke et al., 1990; Stewart et al., 2010) and align with Tomiyama's (2018) weight-stigma model of obesity as it pertains to the bariatric surgery population.

8.3.2.3. Theme Three: Restoring 'Control' over Food. Alongside changing relationships with the self and others, surgery also marked a turning point in relationships with food. Participants described renegotiating their relationship with food and eating, motivated by their desire and determination to sustain weight-loss and avoid adverse consequences of poor eating practices. Intentional adjustments to eating practices were made as individuals reflected on their conscious efforts to increase awareness of personal food choices, reduce portion sizes, and increase mindful eating. These changes were typically made in the early postoperative period which was characterized by reduced hunger, eating urges, and food-related pleasure.

Interestingly, contrasts in the way individuals experienced these physiological changes were emphasised. Some perceived them more favourably than others, specifically those who derived an increased sense of control from reduced food cravings and eating urges. For these participants, the loss of pleasure associated with food was a welcomed sacrifice and surgery marked a transition from helplessness to empowerment as individuals seemed to have felt released from the chains of their prior food addiction. Conversely, others associated the physiological restrictions with a lack of autonomy over eating and expressed frustration towards feeling *unable* to consume certain foods. The notion of control has frequently emerged in post weight-loss surgery discourse, with the initial postoperative period experienced as either a battle for control, or a welcomed opportunity to willingly hand over control to surgical restriction (Marion, 2018; Ogden et al., 2011).

The idea that surgery resulted in a greater perception of self-control by taking away choice may seem somewhat counterintuitive. Yet, the present study suggests that the removal of choice by surgically imposed restrictions helped participants re-establish their sense of self-control. This paradoxical impact of imposed control has been demonstrated in theoretical and therapeutic work in the area of disordered eating, as studies have argued that relinquishing control of food intake may in turn, lead to an improved relationship with food over time (Eisler et al., 2010; Lock & Le Grange, 2013).

However, factors that distinguish between those who experience an increase in perceived control from those who do not are less clear. According to Social Learning Theory (Rotter, 1966), locus of control may have a part to play, that is, the extent to which people believe they, as opposed to external forces, have control over the outcome of events in their lives. Surgery may have reinforced low self-efficacy for those with a higher external locus of control by strengthening beliefs that individuals are incapable of achieving weight loss without external input. Conversely, those with an internal locus of control may be more inclined to internalise the imposed control of bariatric surgery, resulting in a positive shift in psychological state characterised by empowerment (Ogden et al., 2006). Lasting behaviour change related to weight-loss has been associated with an internal locus of control

(Anastasiou et al., 2015). Hence, delivering post-operative care in manner that aims to increase participants' belief in their own ability to impact their health is likely important for long term weight loss (Teixeira et al., 2012). Without this, individuals may be more at risk of weight regain following discontinuation of professional follow-up care (Anastasiou et al., 2015). This therefore warrants further investigation into the notion of perceived control post-surgery and consideration of how this can be strengthened in the provision of follow-up care.

8.3.3. Question Three: A Work in Progress

This section pertains to the ongoing barriers to health-related goals participants identified. Pre-existing psychological difficulties and practical constraints resurfaced over time and proved to challenge individuals postoperatively, in addition to new physical health barriers. The post-surgical challenges outlined by the participants in our study closely align with those of previous research and highlights the complex and changeable nature of the psychosocial impacts of bariatric surgery (Groven et al., 2013; Ogden et al., 2006). Managing weight after bariatric surgery was the most significant concern underpinned by worry, self-doubt, and uncertainty. Fears of "undoing" the effects of surgery approximated people's attention over time and pressure to negotiate this demand intensified as the physiological effects of surgery lessened. Individuals were confronted by the resurfacing of problematic pre-surgical eating attitudes and behaviours underpinned by unresolved psychological difficulties, and challenged by competing life demands. For those who adjusted to new and 'healthy' eating habits, striking a balance between maintaining weight-loss and enjoying food was yet to be experienced and left to be desired.

8.3.3.1. Theme One: The Component between My Ears. Weight-loss surgery evidently fulfilled participants' long-held desires to lose weight and improve quality of life. In most cases, surgery offered either a temporary reprieve from the personal responsibility of managing weight or an increased sense of efficacy in doing so. A strong sense of empowerment was derived from experiencing weight loss without struggle, allowing participants to strengthen personal autonomy, self-confidence and self-esteem. This was referred to as the postoperative “honeymoon period.”

The end of the “honeymoon period” was marked by the return of hunger, slowed weight loss and reduced follow-up care. These changes confronted many with memories of their unhealthy relationships with food pre-surgery, reigniting fears of future weight regain. Disappointment was felt by participants when confronted by the reality that long term behavioral change was required to sustain their weight loss. This rekindled worry for those with ongoing eating disturbances and self-doubt in one’s ability to overcome these issues without having resolved the psychological difficulties that underpinned them. The pressure to change eating practices coupled with a perceived inability to do so, reinforced self-judgment and increased psychological distress. This caused lapses for some who admitted struggling to retain control over eating and resist foods typically associated with weight regain. Shame (a well-known risk factor for adverse postoperative outcomes) was implied by participants who conveyed feeling stuck in emotional eating cycles characterised by vacillating between consuming the “wrong” foods and consequently self-loathing. This incited maladaptive thoughts of perceived failure that have previously proven to be counterproductive and demotivating, preventing individuals from productively managing these lapses (Hall & Kahan, 2018).

These experiences align with those illustrated in previous research that posits eating practices do not always change as expected in the postoperative period, and may worsen in some instances (Johnson et al., 2013; Sarwer et al., 2011). These difficulties are important to note and address, given their association with weight regain and other adverse postoperative outcomes including isolation, poor mental health, increased distress, and low self-efficacy (Coulman et al., 2020). Additionally, both shame and lack of self-confidence prevented participants from support seeking, leaving them stuck in a state of perceived helplessness. This corroborates the findings of two earlier qualitative analyses, where shame was implicated in patients' decisions to avoid bariatric surgery aftercare (Moroshko et al., 2014; Throsby, 2011). This is particularly concerning as aftercare is an essential component of bariatric surgery (Richardson et al., 2009), while avoidance may prevent early detection of support needs which has been associated with better outcomes and helps prevent the re-emergence of maladaptive eating patterns (Meany et al., 2014).

In the present study, even for those who implemented and maintained new eating habits, food remained a complex matter marked by fear and apprehension. Some participants expressed a sense of achievement in upholding new eating practices, whilst simultaneously desiring greater food freedom. While restrained eating behaviour due to surgical alterations is expected in the early postoperative period, greater flexibility towards eating becomes a more viable option over time as physiological restrictions lessen. In fact, expecting strict, absolute changes via rigid dietary rules over lifelong obesity management is a well-known recipe for frustration and failure (Hall & Kahan, 2018; Herman & Polivy, 1984).

Despite the desire for more food freedom, participants reflected apprehension towards deviating from the food rules they followed due to fears this would compromise weight-loss. Flexibility seemed to resemble an undefined boundary that individuals were unsure how to navigate, comparative to the containment and control rule-based eating practices provided. In this way, rule-governed eating behaviour may have protected against the dilemmas associated with food choice and the increased personal responsibility required. Relatedly, some individuals experienced guilt after enjoying food, as if to suggest pleasure threatened relapse and was therefore deemed a necessary sacrifice. This perception may have been reinforced both by internalised pressure to justify undergoing surgical intervention and various external factors from postoperative nutritional advice to the pervasive societal emphasis on healthy eating as a moral obligation. Evidently, finding balance in one's attitude and relationships with food remains a substantial challenge for many postoperatively.

8.3.3.2. Theme Two: Physical Health Barriers. While most found increased strength and functional ability from weight-loss, a minority perceived themselves with greater fragility and susceptibility to sickness postoperatively, citing this as a barrier to health-related behaviours. This perspective highlights the typically unforeseen and overlooked health problems that people may encounter post-surgery (Berg, 2020), contrasting the wide-ranging list of positive outcomes more frequently emphasised. This finding corroborates previous literature similarly depicting improvements in certain aspects of health-related quality of life but not others (Coulman et al., 2013; Colquitt et al., 2014; Lindkilde et al., 2015).

8.3.3.3. Theme Three: Practical Constraints. Finally, 'staying on track' with health goals after surgery appeared complicated by various practical constraints and competing demands in daily life. This required ongoing effort to prioritise health goals in the midst of personal life circumstances that competed for similar cognitive and practical resources.

8.3.3.4. Clinical Implications of Identified Barriers. Our results align with previous research on patient experiences of bariatric surgery which similarly reflected the loss and gains, or somewhat ambivalent nature of the changes experienced (Coulman et al., 2017; Meana & Ricciardi, 2008; Natvik et al., 2015; Warholm et al., 2014). Participants' responses point to key areas of vulnerability that have the potential to compromise postoperative outcomes if unaddressed. Thus, targeting these areas should be prioritised in postoperative care.

Mitigating high levels of shame may begin with creating a safe space for individuals to express their difficulties without judgment. Follow-up care efforts should be directed towards strengthening patients' self-confidence, self-trust, and self-efficacy, all of which appeared to protect against shame and postoperative weight regain in our study, as supported by prior research (Tolvanen et al., 2021). For example, encouraging patient involvement via shared decision making and highlighting patients' internal resources may indirectly encourage patients to take a more active role in addressing ongoing difficulties and seeking help when needed.

Furthermore, gradually negotiating food flexibility into personal diets is likely to be an important aspect of the postoperative process. While surgical restriction can improve perceived control initially, long term adherence to rigid eating practices is both unrealistic and predictive of maladaptive eating patterns as posited by evidence-based theories of restraint (Fairburn et al., 2003; Herman & Polivy, 1984). Follow-up care should therefore promote realistic expectations by encouraging acceptance that rigid adherence to strict dietary guidelines is unrealistic and not indicative of a personal flaw. In addition, supporting patients to apply cognitive flexibility towards their eating regimes in a graduated approach is likely to be useful for long term weight management by mitigating future risk of overeating that results from long term restraint efforts. This provides participants opportunity to address food-related fears in a progressive manner with access to professional guidance and external support. Doing so may result in greater self-efficacy and perceived control regarding food choices, both of which have been linked to positive health outcomes (Hall & Kahan, 2019).

8.3.4. Question Four: Effects of the Foundations of Healthy Living Retreat

8.3.4.1. Theme One: A New Perspective. The Retreat helped participants build greater insights around their personal postoperative experiences. An expanded awareness of personal gains and challenges associated with food and eating was built via reflecting on related internal processes. Participants identified maladaptive thought processes that underpinned poor eating habits and in turn, gained a better understanding of why they struggled with food. Greater awareness was not only limited to the areas of food and eating, but also spanned more broadly to developing a greater sense of self. In light of existing research, the ability to enhance self-understanding is a key strength of the Retreat as earlier work has reflected post-bariatric surgery individuals' desire to develop greater understanding of their eating behaviours and factors that maintained their food addiction, both of which the Retreat addressed (Coulman et al., 2020).

The present findings also concur well with the aims of ACT, one of which is to foster greater self-awareness, and therefore lend additional support to the efficacy of the Retreat in fulfilling this aim. This may be largely due to the experiential learning approach utilised; that is, ACT principles were taught through participant engagement in various activities and tasks that support the acquisition of self-awareness and self-reflection.

Another considerable finding was that increased awareness and understanding appeared to facilitate greater self-compassion, that is, sensitivity to one's own experiences of suffering, inadequacy and failure and recognition this is part of the human condition (Neff, 2003). This supports Hayes' (2008) claim that self-compassion is inherent to the ACT model, with its roots emerging from the six core ACT processes referred to as the hexaflex (experiential acceptance, cognitive defusion, present moment awareness, self-as-context, values, and committed action) that interact to increase psychological flexibility. Dahl and colleagues (2009) have outlined how these six processes directly influence compassion for the self. According to their model, self-compassion involves the ability to willingly experience difficult emotions (experiential acceptance); to mindfully observe distressing thoughts (present moment awareness) without allowing them to dominate mind states or behaviour (cognitive defusion, committed action); to live life with self-kindness and self-validation in accordance with personal values (values); and to flexibly shift our perspective toward a broader, transcendent sense of self (self-as-context, psychological flexibility) (Hayes, 2008).

This is a notable gain given the significance of self-compassion as a key predictor of quality of life and positive health in non-clinical and clinical populations (Sirois, 2020; Terry & Leary, 2011; Van Dam et al., 2011). Further, in Braun et al.'s (2016) systematic review, several beneficial associations were found between self-compassion and markers related to body image and disordered eating. First, self-compassion directly decreased eating disordered outcomes including shape, weight, and eating concerns, cognitive restraint, binge eating, psychological distress, and weight. Second, self-compassion was inversely associated with several risk factors of eating pathology, many of which affected the participants in the present study, including lower media and interpersonal thinness pressures, thin ideal internalisation, body dissatisfaction, body shame, and appearance based social comparisons. Links were also found between self-compassion and protective factors that closely align with the ACT model, including body image flexibility; that is, the ability to tolerate and experience challenging body-related internal thoughts and feelings, body acceptance, and intuitive and mindful eating (Braun et al., 2016).

Of additional significance is Ferreira et al.'s (2013) study findings that self-compassion and shame memories interact to explain eating pathology. More specifically, among females with eating disorders, and females in the general population, those high in self-compassion with shame memories reported less eating pathology than did those low in self-compassion (Ferreira et al., 2013). This holds particular relevance to the present study's participants, as shame related to previous eating difficulties and negative weight-related experiences largely underpinned the psychological barriers to postoperative health goals participants identified. These findings suggest self-compassion therefore offers promise as a potential antidote to these barriers and prioritising self-compassion as a key therapeutic factor in the Retreat may enhance its overall effectiveness.

Helping people re-establish a sense of autonomy and choice in their lives postoperatively was another key strength of the Retreat. This was a particularly powerful finding, as qualitative research in this area has often depicted patients' feeling ruled by their minds both pre- and post-surgically (Graham et al., 2017). This perception, along with the physiological restrictions surgery imposes, may compound patients' lack of autonomy, particularly for those who fail to experience an increase in perceived control post-operatively. Results suggested that re-establishing a sense of autonomy strengthened participants' motivation and belief in their ability to manage future challenges. This may be in part explained by self-determination theory (Deci & Ryan, 2012), which posits the importance of people feeling in control of their own behaviours and choices. Fulfilling an inherent need for autonomy increases an individual's self-determination and motivation for growth and change, both of which are key components of life post-surgery (Deci & Ryan, 2012). This therefore suggests that part of the Retreat's unique value therefore lies in its ability to enhance perceived autonomy, which appears to be especially important in balancing the directive approach that patients receive in their follow-up care encounters with professionals (Tolvanen et al., 2016).

8.3.4.2. Theme Two: A Shared Experience. Social support was another core benefit of the Retreat. Participants valued opportunity to connect with others over shared elements of their postoperative journeys. Being in a group setting provided affective support, reassurance, increased motivation towards health-related goals, and curbed the isolation some experienced after surgery. Participants highly valued each other for their capacity to relate and empathise with lived experiences of bariatric surgery. While not directly stated by participants, it is plausible that the assumption of being understood by the group may have emboldened individuals to be more vulnerable and share their experiences more freely with less fear of judgment (Thoits, 2011).

These findings parallel those identified in other studies of weight-loss surgery that similarly stress the value of social support in post-operative care (Coulman et al., 2017; Hameed et al., 2018). Isolation and loneliness are reoccurring themes depicted in other studies of participants' experiences of bariatric surgery, with lack of access to peer support groups identified as a contributing factor (Coulman et al., 2020; Tolvanen et al., 2021). A number of researchers have found that support group participation is positively correlated with post-operative weight loss and increased satisfaction with bariatric surgery outcomes (Elakkary et al., 2006; Orth et al., 2008; Song et al., 2008).

Conversely, some studies have depicted variable experiences among those who access peer support groups (Berg, 2020; Paretti et al., 2019). Some found them supportive and helpful as in the present study (Livhits et al., 2011), while others felt isolated from other members or deterred by hearing others' struggles (Coulman et al., 2020). Interestingly, being exposed to others' struggles was framed as *useful* in the present study, by increasing personal accountability and vigilance. This extends Thoits' (2011) theory of social support by demonstrating role models do not need to be exclusively aspirational in order to be influential. Additionally, hearing the difficult experiences of those similarly situated helped normalise ongoing challenges with food and eating and offered reassurance. This corresponds with other research demonstrating that sharing postoperative struggles provided reassurance, led to group problem solving efforts, and generated hope, all of which are valuable when navigating the unfamiliar territory of life post-surgery (Ogle et al., 2015).

Earlier work investigating the types of support individuals perceive as most beneficial may provide insights into why participants found such value in the social support at the Retreat (Karfopoulou et al., 2016; Tolvanen et al., 2021). When various forms of support were evaluated by a sample of individuals who were previously overweight attempting to maintain weight loss, instructive support from 'outsiders' including friends and family was perceived negatively and had no impact on the diets of those who were struggling to maintain their weight (Karfopoulou et al., 2016). This may suggest that being reminded to do things that individuals already find difficult to cope with may draw further attention to perceived deficits, and reinforce negative self-judgments and low self-efficacy. In contrast, receiving compliments from others for their existing efforts, in addition to having others actively participate in their healthy habits serves to reinforce a positive sense of self within participants (Karfopoulou et al., 2016; Ogle et al., 2015). This reflects the importance of companionate support, that is, the sharing of everyday activities with others (Ogle et al., 2015). Previous research has demonstrated the benefits of having close others join in with post-surgery routines and adjustments as an effective way to increase encouragement and motivation (Ogle et al., 2015). The Retreat may have been successful in facilitating this form of support, through providing a space for participants to engage in healthy habits and make adjustments together, which in turn, may have increased intrinsic motivation (Karfopoulou et al., 2016). Whānau involvement in the Retreat may further strengthen companionate support for individuals postoperatively, and should thus be considered as part of future intervention development.

The presence of group facilitators may have also maximised the social support participants experienced during the Retreat. This is evidenced by previous research demonstrating that poor support group management can lead to feelings of exclusion and frustration, creating a barrier to the close connections participants desire with other members (Berg, 2020; Ogle et al., 2015). Many of the post-bariatric surgery participants in Coulman et al.'s study (2020) felt a facilitator knowledgeable in bariatric surgery may maximise benefits by encouraging inclusion of all group members and ensuring consistency of information discussed. Thus, the value of Retreat facilitators may have been grounded in their professional expertise that created a sense of 'trust' between themselves and participants.

Additionally, they may have complemented the credibility of peer support by helping to facilitate and strengthen the connections participants developed with each other at the Retreat. This suggests that both informational support from professionals and emotional support from peers are both valued and sought.

8.3.4.3. Theme Three: Support after the Retreat. The final theme pertaining to the impacts of the Retreat reflected a strong desire to access ongoing support afterwards. This finding resonates with those of several other studies that reveal an unmet need for ongoing post-operative support extending beyond the immediate postoperative period of specialist follow-up care (Berg, 2020; Coulman et al., 2020; Lauti et al., 2016; Tolvanen et al., 2021). Opportunities to ‘refresh’ one’s memory of course material and learnings was desired. This could be fulfilled through various courses of action, one of which has already been established in the form of the PACE Programme, an online resource containing Retreat material. While this might serve as a ‘refresher’ of material, our data suggests that creating opportunity for participants to continue supporting one another post-Retreat is also important.

Given the value participants attributed to connecting with each other, considering methods that both fulfil the need for ongoing access to learnings and peer connection is recommended. One option would be the inclusion of ‘booster’ sessions for each Retreat group that could be delivered via teleconference for ease of access. This could be used to review progress, trouble shoot challenges ahead, and discuss relapse prevention whilst providing opportunity for reconnection with fellow Retreat attendees. In this way, booster sessions have the potential to provide the emphasised benefits of the Retreat (facilitator, peer support, accountability) and fulfil the ongoing needs participants expressed including an opportunity to refresh memory of course content and access ongoing support.

While the added benefit of including booster sessions into ACT programs for weight-loss surgery individuals is not yet known, evidence supports the value of booster sessions in

CBT programs for weight-loss and healthy eating (Cassin et al., 2020). Research into this is already in progress, as evidenced by the development of a recent study protocol for a randomised controlled trial of an ACT-based intervention for weight loss maintenance (Lillis et al., 2021). The programme will include a 1-month postvention booster session of which the results may further elucidate potential benefits of this addition (Lillis et al., 2021).

8.3.5. Summary

The qualitative results were complimentary to those of the main quantitative analyses discussed in the preceding chapter. Quantitative findings displayed the effectiveness of the Retreat in targeting the selected outcome variables, from which broad conclusions could be drawn with limited context. Thus, the addition of the qualitative findings allowed for deeper exploration into the potential meanings ascribed to the main findings, offering additional context into possible explanations for the main results.

First, the qualitative findings may help in explaining the lack of significant difference in weight-related experiential avoidance between the Retreat group and controls. Participants described early traumatic experiences of weight-stigma, expressing both internalised stigma and shame about their bodies. These factors likely contributed to the forming of negative attitudes around weight and shape that were captured by the Acceptance and Action Questionnaire for Weight-related Concerns (AAQW). The longstanding nature of participants' negative self-perceptions and the various ways in which these continued to be reinforced through weight-stigmatising interactions suggests these attitudes are likely to be relatively stable and may require more targeted psychological input before long-term change can be reasonably expected.

Second, the qualitative results may also help to explain the minimal changes observed in flexible restraint scores over time in the Retreat group. When describing their relationship with eating postoperatively, participants emphasised a lack of self-trust and appeared to adopt rule-based attitudes towards food. This could suggest that self-trust may be a prerequisite to successfully exercising food flexibility and aiming to strengthen participants' self-trust may be a worthwhile intervention target.

Third, the lack of change in emotional eating subscale scores was perhaps unsurprising given several participants identified this as a longstanding coping mechanism for managing distress. Responses also illustrated the cycle of shame that ensued as a result of emotional eating, further emphasising the importance of psychological interventions addressing this behaviour. Relatedly, this information guided suggestions for future intervention ideas, including the relevance of incorporating distress tolerance into ACT-based treatments.

In sum, by elucidating attitudes and beliefs associated with each of the main outcome variables, the qualitative findings also helped to clarify participant needs that formed the basis of suggestions for the future development of interventions for this population.

9. General Discussion

The following section summarises the study's main quantitative and qualitative findings and takes into consideration limitations which provide important avenues for future research, both in terms of methodological improvements and therapeutic intervention development. The study's strengths are also discussed, and clinical implications of the thesis as a whole are cited, with a particular emphasis on potential improvements to the therapeutic process.

9.1. Summary of Findings

Taken together, the study's main findings present an evaluation of the impact of the ACT intervention delivered through the Foundations of Healthy Living Retreat, with regards to several outcome variables including weight-related experiential avoidance, disordered eating, flexible dietary restraint, and BMI. In accordance with this study's quantitative findings, the FOHL Retreat has demonstrated itself as a valuable resource to further augment health outcomes for individuals post weight-loss surgery. Multilevel models indicated that post-bariatric surgery participants who attended the ACT Retreat did not significantly differ from the control group. However, a sensitivity analysis using a mixed ANOVA found a significant interaction between group and time and indicated that the rate of change in weight-related experiential avoidance between the Retreat group and control group was significantly different. Therefore, the results for Hypothesis 1 are somewhat ambiguous given the discrepancy in findings between the main multilevel model and the supplementary mixed ANOVA.

Multilevel models indicated that significantly larger improvements in disordered eating and BMI were found in the Retreat group compared to the control group over time. The Retreat did not produce statistically significant changes in uncontrolled eating, emotional eating, or flexible dietary restraint over time.

Weight-related experiential acceptance fully mediated the effect of the Retreat on disordered eating and partially mediated the Retreat's influence on weight-loss. These results support the FOHL Retreat as an effective intervention for individuals post weight-loss surgery, that produces positive change in the theoretically expected way; that is, through targeting experiential avoidance.

Supplementary qualitative findings offered additional context to the main findings by providing greater insight into individuals' relationships to the relevant outcome variables pre-surgically and their perceptions of how their relationships to these variables were impacted by weight-loss surgery and the FOHL Retreat. Participants highlighted the longstanding nature of their eating disturbances and psychological difficulties that continued to affect them postoperatively and compromise long-term weight management. These findings further emphasise the significance of the Retreat as a valuable resource that produced positive change in these areas of ongoing challenge, specifically in relation to disordered eating and weight.

Qualitative responses also offer potential explanations as to why positive changes in weight-related experiential avoidance and flexible restraint were not observed in the Retreat group. In particular, qualitative responses reflected the complex nature of individual psychological attitudes, suggesting that more intensive and long-term intervention that targets psychological flexibility and related constructs is likely needed before change can be expected.

9.2. Study Limitations and Directions for Future Research

The results of this study must be considered in light of a number of limitations. First and foremost, notwithstanding its merits, potential confounding factors associated with the study's design must be acknowledged. A quasi-experimental design was utilised, specifically, a pre-test and post-test non-equivalent control group design and thus, selection bias was the main threat to internal validity. While a ‘true’ experimental design with group randomisation would have proven superior as the ‘gold standard’, this was both logistically and ethically unfeasible for several reasons including that Retreat participants self-funded their Retreat attendance.

While efforts were made to account for measurable differences between this study’s control and Retreat groups, unmeasured differences that reduce comparability between groups may exist. It is possible that Retreat participants may have had higher levels of motivation to adhere to necessary post-surgical lifestyle changes. It was not possible to randomise participants to groups and hence, selection bias could not be countered. Additionally, while participants intending to participate in other weight-loss focused programs over the data collection period were excluded, it is possible this could have changed over the 3-month data collection period. Furthermore, following the pre-test, Retreat participants in particular may have experienced a greater desire relative to controls, to report post-test improvement following their participation in the Retreat. Alternatively, control participants may have also experienced a desire to reflect improvement in their pre-to-post-test responses as a means of justifying their decision not to attend the Retreat. Efforts were made to minimise these potential threats to internal validity by emphasising that individual responses would not be shared directly with the Retreat programme facilitators while study information was carefully worded to avoid promoting compensatory rivalry within the control group.

Although all efforts were made to recruit participants and Retreat attendees specifically, a relatively low sample size was used to examine the efficacy of the Retreat and the majority of participants were controls, with only 15 Retreat participants who completed assessment measures at all three measurement points. This increased the risk of Type II error, that is, failure to reject a null hypothesis that is false, whilst also increasing the uncertainty surrounding parameter estimates (as reflected in the confidence intervals). Participant dropout may also impact the validity of the results if reasons for dropout included those that have the potential to undermine the effects of the intervention. While reasons for dropout were unknown, only 2 Retreat participants (8% of total Retreat sample) did not provide follow-up data following their Retreat attendance while a Little's MCAR test indicated no evidence to suggest that data was not missing at random.

Originally the study was open to individuals between 6 and 18 months postoperatively, but in an effort to include more participants, this window was extended to 2.5 years post-surgery. While the wider variation in time increased between-participant variation, time since surgery was controlled for in supplementary analyses.

The majority of participants were primarily female and of Pākehā (New Zealand European) descent. The overrepresentation of females in bariatric surgery research is common and may partly reflect the considerable gender disparity among those seeking bariatric surgery population with women comprising 80% of these individuals, despite similar obesity rates across genders (Aly et al., 2020). This may be in part attributable to higher rates of mental health difficulties affecting females seeking surgery including trauma, anxiety, depression and eating disorders (Imperatori et al., 2016; Mahony, 2008). These are well known risk factors for obesity and significantly impair quality of life which may in turn, motivate efforts to seek treatment (Kochkodan et al., 2018). Relatedly, poorer quality of life and greater body dissatisfaction among female surgical candidates relative to males may also increase motivation for surgery, with males experiencing less weight-related disturbance and less accurate weight-perception than females (Aly et al., 2020; Grilo et al., 2005; Mazzeo et al., 2006). It is therefore important to highlight that the majority of the present results reflect the experiences of post-bariatric females and cannot be confidently generalised to men.

Furthermore, Māori and Pasifika are overrepresented in obesity statistics in New Zealand, and the lack of their representation in this research is of importance to note. These populations are important to include in future bariatric surgery research in New Zealand, in order to eliminate ethnicity biases and reduce inequities in follow-up care. The nature of the study sample may be partly attributable to the chosen recruitment methodology, as publicly funded intervention rates by ethnicity (using year ethnic population estimates and obesity prevalence statistics from 2004 – 2017) indicated Māori and Pasifika people received far fewer surgeries than Pakehā (Garrett et al., 2020). Subsequent research should aim to recruit a more culturally diverse sample in order to best understand the extent of possible influence the Retreat may have on diverse groups and those underrepresented in bariatric surgery research (such as men and ethnic minorities) in order to mitigate bias.

It will be important to replicate the findings of this study in a much larger sample of bariatric surgery individuals, with a greater number of Retreat participants. If the ACT intervention used in the FOHL Retreat is found to be effective in improving experiential avoidance, eating disorder symptomatology and weight management in a larger replication study, it would be informative to examine the mechanisms of change and predictors of response. This would provide greater insight into the Retreat intervention components most responsible for positive outcomes which would be useful to guide future programme development.

By conducting mediational analyses, our study examined a key ACT mechanism of change. As predicted by the ACT model, weight-related experiential avoidance mediated eating behaviours and BMI. However, in order to be determinative, mediators should be measured before outcomes change (Maric et al., 2012). The measurement design was unable to confirm temporal precedence; that is, the changes in weight-related experiential avoidance preceded changes in eating behaviours and BMI, as both the mediating variable and treatment outcomes were measured at the same time. Satisfying this condition would require administering the AAQW before treatment outcome measures to provide an opportunity to test for reciprocal mediating effects (e.g. changes in AAQW scores lead to changes in eating behaviour and BMI, not vice versa) (Maric et al., 2012). Further, it is recommended that measurements are taken at time points when changes in the mediator are expected to cause changes in the treatment outcome. Yet, it is difficult to predict when maximum change in treatment outcomes will occur, especially in the absence of related findings that could be used to guide predictions.

Given the heavy reliance on self-report measurements to investigate the primary and secondary hypotheses, social desirability bias and response bias may have confounded results. Moreover, in the case of the self-report questionnaires, responses were limited to the survey items and thus may not have fully captured participants' experiences. Hence, efforts were made to discuss the qualitative results in relation to the main quantitative findings to offer further insight into the key areas of interest.

While the qualitative component of the present research provided valuable insights that aligned and complemented our quantitative results, specific issues were not investigated in depth. This was a preliminary study where questions were designed to examine participants' experiences pre- and post-surgery with a broad view. The themes generated from these open-ended text-response questions provide a glimpse of the feelings and experiences of participants pre- and post-surgery. Future research may benefit from conducting a more in-depth exploration and analysis of emerging themes raised by participants, including shame, control, and perceptions of self to further understand their role in postoperative quality of life and health outcomes. These themes may be best explored using individual interviews to create a shared space for mutual dialogue, which may extend reflections and help elicit a richer understanding of the personal meanings attached to these themes.

The generalisability of our study's findings is limited to participants between 6 months and 2.5 years post-surgery. This timeframe was selected to limit the variability that characterises different postoperative stages over time and maximise participant recruitment as most individuals attended the Retreat within this time range. However, future studies should also concentrate on examining the efficacy of interventions for those in later post-operative stages, as research suggests many are confronted with significant challenges over time, with few follow-up studies in the 5 year and above postoperative range (Courcoulas et al., 2014). Comparing the efficacy of ACT in different postoperative phases may also help to establish when ACT is best used within this population.

Lastly, the follow-up assessment in our study was short-term which limits the inferences that can be drawn from our results. A longer-term follow-up period would have enabled examination of programme effects over time and potentially elucidated cumulative outcomes, and reflected the stability and consistency of the benefits of the FOHL Retreat (Hill et al., 2016).

9.3. Study Strengths

Notwithstanding its limitations, this study offers several strengths. To the best of the author's knowledge, this is the first study to examine the efficacy of an ACT-based intervention for post weight-loss surgery individuals in New Zealand, in which the findings may be helpful in contributing to future improvements in practice and research. Our research succeeded in obtaining comprehensive results demonstrating the efficacy of the FOHL Retreat, an ACT-based intervention, in augmenting post-bariatric surgery outcomes. This contribution is significant, as bariatric surgery literature has persistently highlighted several challenges patients face that compromise surgical outcomes in the long-term, for which solutions are yet to be identified.

Merit can also be found in this study's methodology. Specifically, the study was comprehensively preregistered prior to beginning data collection and both data and R Script was shared openly for peer examination. Additionally, the use of a quasi-experimental non-equivalent groups design with the addition of a control group strengthened the internal validity of this study. A mixed methods approach was chosen which distinguishes our research from the majority of other studies in this area that have typically utilised a single method research design. The mixed methods design produced insights and understanding that might have been missed by using a single method only, and offered several strengths that supported the overarching research aims. The quantitative component fulfilled the main study aim of evaluating the efficacy of the FOHL Retreat for postoperative individuals, while qualitative data enabled better understanding and interpretation of the quantitative results. Further, the combined approach provided opportunity to elicit deeper meaning to the variables studied, whilst ensuring that findings were grounded in participants' experiences.

Qualitative findings provided details about the meaning of the bariatric experience including factors that contributed to participants' decision to seek surgery, personal challenges participants faced post-surgery, and impacts of the Retreat on an individual level. Sharing these results provides opportunity for future patients, their families, and healthcare providers to gain further understanding of the experience of undergoing bariatric surgery and adjusting to life thereafter. This is highly valuable, as increased understanding of the psychological experiences of bariatric surgery individuals offers the potential to unveil vulnerability factors, resiliency factors, and individual strengths that can be addressed in the postoperative stage to enhance outcomes. In sum, the mixed methods approach produced more complete knowledge to help inform future intervention and practice. It is also our belief that the quantitative and qualitative findings served to complement each other, collectively providing a stronger argument for the value of psychological input for those seeking bariatric surgery.

The use of multilevel analysis also allowed the present study to make a unique contribution to the literature. The comprehensive literature review that preceded the present study revealed the lack of research that uses advanced longitudinal analysis when evaluating therapeutic processes and outcomes. While the results of the study remain preliminary, applying a multilevel analysis to this area of investigation is notable and the findings reflect the depth and accuracy of analysis a hierarchical structure provides by allowing for analysis of both within-individual and between-individual variability. Furthermore, strength also lies in the present study's sensitivity analyses which included the use of mixed ANOVAs, providing quantitative assessment of the robustness of the main multilevel model findings. Supplementary analyses were also applied to assess the potential impact of time since weight-loss surgery on the main interaction effect between group and time on the dependent variables in each multilevel model. Both of these statistical methods enabled further verification of the results and in this respect, it is hoped the present study will make a valuable contribution to the research field.

The current study also aimed to address methodological limitations of prior studies in several ways. For example, careful consideration was given to selecting how best to measure process and outcome variables in light of existing research. For example, the AAQW was chosen over the AAQ, given that research recommends the use of specific measures of experiential avoidance (AAQW) relevant to the topic of interest above those more general (AAQ) (Lillis & Hayes, 2008; Palmeira et al., 2016). Our study makes a unique contribution in its discernment between emotional eating and uncontrolled eating, as most prior research measures a combination of the two, conceptualised as disinhibited eating. Similarly, the decision to distinguish between the different types of restraint is a unique contribution to the literature, with most studies measuring this as a single construct. The decision to measure flexible restraint was made with careful consideration given to the bariatric surgery context. Flexible restraint was chosen with recognition to the potentially harmful effects of rigid restraint, whilst acknowledging that exercising a degree of restraint is necessary in the postoperative period in order to sustain long-term weight-loss outcomes. Further, despite its limitations, the flexible restraint items of the restraint scale were selected on the basis of prior research supporting this as the most valid and suitable measure of restraint in overweight and obese populations at the time.

Lastly, mediational analyses in the study enhanced our understanding of the role of experiential avoidance as a key mechanism of change in the measured outcomes and a good proximal target for intervention. Mediation was conducted to test the underlying ACT model whilst verifying that the FOHL Retreat impacted treatment outcomes in a manner consistent with this framework, that is, by targeting experiential avoidance.

9.4. Clinical Implications

The importance of addressing psychological factors for individuals in the post-operative phase of bariatric surgery cannot be understated. Though surgery appeared to alleviate pre-existing eating disturbances in at least the short term, the need to address their continuation is clear. Given the association between eating disturbances, psychological distress, reduced quality of life, and poor long-term surgical outcomes, identifying psychological interventions that effectively target these domains is an important part of extending positive surgical outcomes.

Both the quantitative and qualitative findings of this study provide support for the ACT treatment model in terms of optimising bariatric surgery outcomes in a New Zealand population of post-bariatric surgery individuals. Significant improvements were found in disordered eating and BMI, two key outcome variables. Our study also indicates that these improvements were produced in part by way of targeting experiential avoidance, the key mechanism of ACT, thus supporting the furtherment of ACT-based interventions within a bariatric surgery context.

The results presented here indicate that psychological support for those seeking bariatric surgery should be seen as a core component of bariatric surgery care provision, alongside the standard medical input. The provision of such care should be offered in a supportive and non-judgmental manner, given the high levels of shame and internalised stigma associated with food, eating and body image within this group. Additionally, participants emphasised the value of connecting with other bariatric surgery individuals within the therapeutic intervention and accessing the ongoing support of facilitators with professional expertise. Furthermore, redefining one's relationship with food post-surgery can be considered both an interpersonal and contextual issue. Hence, including whānau in the intervention may further strengthen perceived support for individuals post-operatively.

In addition to supporting acceptance-based interventions as a promising framework in the context of bariatric surgery, our results also provide opportunity to reflect on ways this framework and its provision could be strengthened to further augment postoperative outcomes. Our findings suggest that experiential avoidance is a dynamic process that may be most effectively targeted over a spaced period of time, as opposed to in a consolidated format. Thus, when considering ways of incorporating ACT-based interventions into surgical care plans, using a spaced delivery format over a period of weeks may be worthwhile.

Although research remains inconsistent concerning the timing of an adjunctive psychological intervention in the bariatric surgery process (Livhits et al., 2012), there is some evidence to suggest pre-surgical intervention may help to prepare candidates for surgery and adjustments afterwards (Cassin et al., 2016). Offering an ACT-based intervention beginning prior to surgery, and continuing in after-care may be worthwhile and mitigate several risk factors for less optimal long-term surgical outcomes including emotional eating, depressive symptoms, low social support, and unrealistic weight loss expectations (Delparte et al., 2019; Sheets et al., 2015). This may support individuals to feel more empowered and self-confident in managing their eating and associated difficulties during the postoperative period. It would additionally provide individuals an opportunity to both strengthen their support network, by connecting with others embarking on the same process, and build their inner resources, through learning acceptance-based techniques that can be practiced prior to surgery. This may be especially useful given the cumulative benefits of techniques, such as mindfulness, as recently demonstrated by an integrative review of mindfulness-based practices (Schuman-Olivier et al., 2020). Furthermore, the effect of acceptance-based strategies on behaviour change is likely gradual, with the former expanding one's capacity for behaviour change, in part through targeting higher-order cognitive functions involved in self-regulation (Schuman-Olivier et al., 2020).

As the development of ACT-based interventions for the bariatric surgery population remains in its infancy, reflecting on ways to further tailor such interventions to better address the needs of individuals undergoing bariatric surgery may be worthwhile, to maximise intervention outcomes. Our results offer useful insights from which ideas about how to further tailor ACT-based interventions to better suit the bariatric surgery context can be generated. One such idea involves incorporating Dialectical Behavioural Therapy (DBT) principles into treatment based on the following reasons. Firstly, DBT has been recognised as an effective treatment for individuals with obesity and eating disturbances (Roosen et al., 2012), trauma (Brown & Dahlin, 2017; Fasulo et al., 2015; Steil et al., 2018), and shame (Neacsiu et al., 2018; Rizvi et al., 2011), all of which have been found to affect up to two thirds of the bariatric surgery population as evidenced in the present study and in prior research (Farr et al., 2014; Fink & Ross, 2017; Wildes et al., 2008).

Second, DBT has proven efficacious in targeting the same mechanism as in ACT, that is, experiential avoidance, for individuals with eating concerns (Delparte et al., 2019). Third, affect dysregulation appears to be a common pre-existing difficulty for bariatric surgery individuals that may underlie and maintain eating pathology (Klein et al., 2012; Masson et al., 2013; Safer & Jo, 2010). This was particularly evident in participants' endorsement of weight-related experiential avoidance and emotional eating items, and further emphasised within the qualitative responses where eating was identified as a means of coping with uncomfortable emotional states such as stress, disappointment, and shame.

Hence, incorporating DBT skills training that emphasises affect regulation may support acquisition of emotion regulation strategies and distress tolerance, and may further aid in reducing postoperative eating pathology (Delparte et al., 2019). Furthermore, the shared emphasis on mindfulness as a core component of both DBT skills training makes it suitable for integration within an ACT framework. Thus, integrating DBT-based principles may strengthen ACT treatment targets both directly, through targeting experiential avoidance, and indirectly, by addressing related constructs including emotional regulation and distress tolerance, that serve as the building blocks for psychological flexibility.

Lastly, psychological interventions for bariatric surgery candidates should be developed with recognition to the resource-intensive nature of delivering in-person psychological interventions and the logistical and practical constraints that may limit their accessibility to participants (such as time, cost, location). An online intervention programme offers a potential solution to these accessibility barriers, while growing support exists for the efficacy of internet-based ACT programmes on mental health outcomes, including those relevant to the present research (Thompson et al., 2020). A systematic review of the effectiveness of ACT for body image dissatisfaction and weight self-stigma, found positive outcomes across five of six studies using an online ACT-intervention (Griffiths et al., 2018). Improvements in eating disordered behaviours, acceptance for weight-related thoughts and feelings, and quality of life have also been found from ACT delivered online (Järvelä-Reijonen et al., 2018; Weineland et al., 2012a).

Development of an online Retreat programme was undertaken by the Retreat director over the course of this research and entitled the PACE Programme. This was made readily accessible for all weight-loss surgery participants. Programme content matches the Retreat but represents a condensed version of teachings, with not all Retreat modules included. Participants are free to complete the programme at their own pace and refer back to content as desired. This may be beneficial in fulfilling participants' desire to refer back to Retreat programme content, as reflected in qualitative responses discussed earlier.

In addition to recognising the potential strengths of an online ACT-based programme, potential limitations of this format must also be considered. Given the benefit participants found in connecting with other participants at the Retreat, the absence of this opportunity may represent a significant limitation of the current PACE Programme and future online interventions. The absence of group work also prevents shared reflections and problem solving, both of which offer key learning opportunities Retreat participants valued. Additionally, the presence of facilitators to deliver Retreat material, provide experiential learning opportunities, and guide reflective practice was another valued element of the in-person Retreat. Facilitators may be a particularly important resource in ACT interventions given their ability to guide both experiential learning and reflective practices, both of which are core ACT processes through which psychological flexibility is strengthened (Harris, 2009). Further, listening to peers reflect with similar experiences may enhance personal reflections while facilitators can skilfully incorporate therapeutic principles in their reflective feedback and in doing so, reinforce ACT's core components.

Support for the relative benefit of facilitator guidance in ACT has been demonstrated by a recent systematic review and meta-analysis of internet-based ACT programmes on mental health outcomes (Thompson et al., 2020). Therapist guidance moderated improvements in psychological flexibility outcomes, in that studies without therapist guidance demonstrated nonsignificant effect sizes compared to guided internet-ACT studies (Thompson et al., 2020). However, these results were cautioned by there being fewer studies with no therapist guidance. Nevertheless, the value of therapist guidance has been previously shown in studies demonstrating its moderating effects on psychological flexibility in self-help ACT (French et al., 2017) and mindfulness interventions (Spijkerman et al., 2016). Hence, the qualitative results of the present study in conjunction with the suggest that programme facilitators and learning in a group setting represent two resources that may maximise intervention outcomes and are currently limited in the PACE Programme.

In the first instance, future research should focus on evaluating the impacts of the current version of the PACE Programme and compare these to Retreat outcomes. Similar to the present study, a quasi-experimental design with three groups including the PACE Programme, FOHL Retreat, and a control group could be utilised. This would provide preliminary information about the efficacy of an online version of the Retreat while the moderating effects of learning in a group setting versus individual online and facilitator guided versus self-guided, could be investigated. This would provide some indication of the increased benefit that may result from incorporating these elements into future online programme refinements.

10. Conclusion

Despite some limitations, the present study makes a significant contribution to research across a number of areas. This study provides preliminary support for the FOHL Retreat in augmenting the health outcomes of weight-loss surgery for individuals between 6 months and 2.5 years post-surgery. The findings of this study contribute to the body of existing literature supporting the efficacy of ACT-based interventions for the weight-loss surgery population. Positive changes in eating behaviour and BMI were demonstrated, both of which have been consistently identified as largely influential to post-surgery quality of life. Both quantitative and qualitative results highlight the complexity and continuing psychological needs of patients following bariatric surgery, including support with eating disturbances, self-image, and re-establishing control, self-confidence, and personal identity. We have also identified the various challenges many are confronted with post-surgery and gaps in postoperative care. It is hoped that a more comprehensive understanding of those variables implicated in positive postoperative outcomes will help to guide significant improvements in the therapeutic support available to bariatric surgery individuals in the future and strengthen alignment between care provision and individual needs. With a more comprehensive understanding of those variables implicated in positive postoperative outcomes, it is hoped that guidance has been provided for significant future improvements in the therapeutic and psychological support available to bariatric surgery individuals.

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12. Appendix A: Study Advertisement

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
UNIVERSITY OF NEW ZEALAND

Have you had weight-loss surgery between 6 to 18 months ago?

What are your thoughts and feelings towards food, eating and weight?

For the purposes of my research, I'm interested in finding out about your relationship with food, eating, and body weight, and how this might have changed since having surgery.

I'm looking for

Individuals who have had weight-loss surgery between 6 to 18 months ago. This includes a Laparoscopic Roux-en-Y Gastric Bypass, Laparoscopic Sleeve Gastrectomy, or a Loop (Mini) Gastric Bypass.

Participation will involve

- Completing a 15 minute online survey at three time points during a 4 month period. The survey contains questionnaires that ask about attitudes towards weight, eating, and food.
- You will also have the opportunity to reflect upon your journey with food and body weight leading up to, and following your decision to have weight-loss surgery.
- Your responses will be kept strictly confidential and your contribution greatly valued.
- We will offer you a $20 petrol voucher as a token of appreciation for your participation.

CLICK HERE IF YOU'RE INTERESTED IN PARTICIPATING

If the above link doesn't work please click the following URL: ${l://SurveyURL}&Group=2

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application SOA 18/57. If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone +64 63569099 x 85094, email humanethicsoutha@massey.ac.nz

13. Appendix B: Study Information Sheet

MASSEY UNIVERSITY TE KUNENGA KI PŪREHUROA UNIVERSITY OF NEW ZEALAND

School of Psychology

MASSEY UNIVERSITY COLLEGE OF HUMANITIES AND SOCIAL SCIENCES TE KURA PŪKENGA TANGATA

A Study of Psychological Outcomes of Wellbeing Post Weight-Loss Surgery

Information Sheet

Kia Ora, my name is Natalija Damnjanovic and I am a student at Massey University. I am conducting this research project as part of the Doctoral Programme in Clinical Psychology. My supervisors for this project are Dr Kirsty Ross and Dr Matt Williams.

Project Description and Invitation

This project aims to explore changes to weight, relationship with food, and thoughts and feelings about food/weight for individuals who have had weight loss surgery. We would like to compare changes over time between individuals who have received psychological intervention (the Foundations of Healthy Living retreat) and individuals who have not. You have been selected as someone who could provide us with information about naturally occurring changes over time. We would like to invite you to take part in this voluntary study.

Who can participate?

We would like to hear from you if you:

- Have had weight-loss surgery between 6 months and 2.5 years ago.
- Have not previously attended the Foundations of Healthy Living retreat.
- Are not planning to attend the Foundations of Healthy Living Retreat over the next four months.
- Are not attending any other weight-loss focussed programme over the next four months. Examples of weight-loss focussed programmes include *Weight Watchers* or *Jenny Craig*, but does not include using the online *PACE Program* developed by Weight Loss Surgery Limited, going to the gym, playing sports, or eating healthy.

What does it involve?

If you are willing to be a part of this study, you will be asked to complete a survey at three time points during a 4 month period. There will be one survey to complete once you have provided consent to participate in this study, one survey to complete three weeks from now, and a final survey to complete in approximately 4 months from now. The survey contains two questionnaires that ask about people's' attitudes towards weight and food. At the first time point, there will also be some questions that ask about your experiences of weight and eating more broadly. The first survey will take between 15 and 30 minutes to complete, and the second and third surveys will take approximately 15 minutes each.

What will happen to the information collected?
Your responses will be kept strictly confidential. Any information that could identify who you are (e.g., your email address) will only be accessible by the research team. Identifiable information will be stored securely on a password-protected computer, and deleted once the project is complete. Please note that as the service provider, Weight-Loss Surgery Limited and the Foundations of Healthy Living retreat will be named in the research project. Once the project is complete, a de-identified copy of the dataset will be posted on an open-access online repository. This preserves the research data and can help to improve future research by allowing other researchers to review, understand, validate, and replicate the study. Any information that might identify who you are will be removed before this dataset is shared.

What are your rights as a participant?
If you choose to participate, you will have the right to:

- Ask any questions about the study.
- Decide not to answer any particular question.
- Stop completing the survey.
- Withdraw from the study at any time up until you have completed the third and final data collection point.

What will you receive?
We will offer you a $20 petrol voucher as a token of appreciation upon receipt of your third and final survey completion. Once the project is complete, you will also receive a summary of the research findings.

If you would like to participate in this study, please ensure you complete the first survey by Friday 12th July, 2019.

If you have any queries about the research project or questions, please do not hesitate to contact me or my supervisors Dr Kirsty Ross and Dr Matt Williams:

Contact information:
Researcher
Natalija Damnjanovic

Natalija.damnjanovic.1@uni.massey.ac.nz

Supervisors
Dr Kirsty Ross
k.j.ross@massey.ac.nz

Dr Matt Williams
m.n.williams@massey.ac.nz

Thank you for your time.

Ngā mihi nui,
Natalija Damnjanovic

Te Kunenga ki Pūrehuroa

Massey University School of Psychology – Te Kura Hinengaro Tangata
Palmerston North, New Zealand
T +64 6 3569-099 ext 85071 : W psychology.massey.ac.nz

This project has been reviewed and approved by the Massey University Human Ethics Committee: Southern A, Application SOA 18/57.
If you have any concerns about the conduct of this research, please contact Dr Lesley Batten, Chair, Massey University Human Ethics Committee: Southern A, telephone +64 63569099 x 85094, email humanethicsoutha@massey.ac.nz

>> Next

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14. Appendix C: Script Read to Retreat Participants

Kia Ora,

As you may have seen, two weeks ago you were sent an email flyer with an invitation to participate in a research study conducted by a Massey University student named Natalija. Natalija is currently completed her doctoral studies in Clinical Psychology and her project aims to explore how your relationship with food, eating and body weight may have changed since having weight-loss surgery. She is especially interested in hearing from individuals like yourselves, who are taking part in the FOHL Retreat.

Participation in the study involves completing 3 short online questionnaires over 3 months. All of your responses will be kept confidential. You will receive a $20 voucher as a token of appreciation for your participation and a summary of the research findings. Your participation will provide valuable information that may help to improve how disordered eating, obesity, and life after weight-loss surgery is understood and addressed in order to make a positive difference to those affected. Today is the last day you can complete the first survey. If you would like to participate in the study and haven't already, you are welcome to take 10-15 minutes to read the study's information sheet and complete the first survey during your free time which will start shortly. The survey link can be found in your emails and will work on all electronic devices including your phone, laptop, or iPad.

Ngā mihi nui,
Thank you.

15. Appendix D: Acceptance and Action Questionnaire for Weight-related Experiential Avoidance.

AAQW

Below you will find a list of statements. **Please rate the truth of each statement as it applies to you**.

Use the following scale to make your choice.

1 = Never true, 2 = very seldom true, 3 = seldom true, 4 = sometimes true, 5 = frequently true, 6 = almost always true, 7 = always true

	1	2	3	4	5	6	7
It's ok to feel fat	○	○	○	○	○	○	○
When I have negative feelings, I use food to make myself feel better	○	○	○	○	○	○	○
I try to suppress thoughts and feelings about my body or weight by just not thinking them	○	○	○	○	○	○	○
I am not in control of what I eat	○	○	○	○	○	○	○
I try hard to avoid feeling bad about my weight or how I look	○	○	○	○	○	○	○
I am in control of how much physical activity I do	○	○	○	○	○	○	○

When I evaluate my weight or appearance negatively, I am able to recognize that this is just a reaction, not an objective fact	○	○	○	○	○	○	○
In order to eat well and do physical activity, I need to feel like it	○	○	○	○	○	○	○
I need to feel better about how I look in order to live the life I want to	○	○	○	○	○	○	○
Other people make it hard for me to accept myself	○	○	○	○	○	○	○

Page Break

If I eat something bad, the whole day is a waste	○	○	○	○	○	○	○
I should be ashamed of my body	○	○	○	○	○	○	○
I need to avoid social situations where people might judge me	○	○	○	○	○	○	○
I will always be overweight	○	○	○	○	○	○	○

End of Block: Acceptance and Action Questionnaire

Start of Block: Three Factor Eating Questionnaire

X→

16. Appendix E: Three Factor Eating Questionnaire – Revised 18-Item (Uncontrolled and Emotional Eating)

TFEQa Please read each statement and select from the multiple choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

	Definitely true	Mostly true	Mostly false	Definitely false
When I smell a delicious food, I find it very difficult to keep from eating, even if I have just finished a meal.	○	○	○	○
When I feel anxious, I find myself eating.	○	○	○	○
Sometimes when I start eating, I just can't seem to stop.	○	○	○	○
Being with someone who is eating often makes me hungry enough to eat also.	○	○	○	○
When I feel sad, I often overeat.	○	○	○	○

Page Break

TFEQb Please read each statement and select from the multiple choice options the answer that indicates the frequency with which you find yourself feeling or experiencing what is being described in the statements below.

	Definitely true	Mostly true	Mostly false	Definitely false
When I see a real delicacy, I often get so hungry that I have to eat right away.	○	○	○	○
I get so hungry that my stomach often seems like a bottomless pit.	○	○	○	○
I am always hungry so it is hard for me to stop eating before I finish the food on my plate.	○	○	○	○
When I feel lonely, I console myself by eating.	○	○	○	○
I am always hungry enough to eat at any time.	○	○	○	○

Page Break

TFEQ_11 How often do you feel hungry?

- Only at meal times
- Sometimes between meals
- Often between meals
- Almost always

TFEQ_12 Do you go on eating binges though you are not hungry?

- Never
- Rarely
- Sometimes
- At least once a week

End of Block: Three Factor Eating Questionnaire

17. Appendix F: Flexible Dietary Restraint Scale

FC_1 When I have eaten my quota of calories, I am usually good about not eating anymore.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_2 I deliberately take small helpings as a means of weight control.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_3 While on a diet, if I eat food that is not allowed, I consciously eat less for a period of time to make up for it.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_4 I consciously hold back at meals in order not to gain weight.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_5 I pay a great deal of attention to changes in my figure.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_6 How conscious are you of what you are eating?

- Not at all
- Slightly
- Moderately
- Extremely

FC_7 How likely are you to eat consciously less than you want?

- Unlikely
- Slightly unlikely
- Moderately likely
- Very likely

Page Break

FC_8 If I eat a little bit more on one day, I make up it for the next day.

- Never
- Rarely
- Often
- Always

FC_9 I pay attention to my figure, but I still enjoy a variety of foods.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

FC_10 I prefer light foods that are not fattening.

- Definitely false
- Mostly false
- Mostly true
- Definitely true

Page Break

FC_11 If I eat a little bit more during one meal, I make up it for it at the next meal.

- Never
- Rarely
- Often
- Always

FC_12 Do you deliberately restrict your intake during meals even though you would like to eat more?

- Never
- Rarely
- Often
- Always

18. Appendix G: Assumption Testing

Figure G1

Histogram Showing the Distribution of the AAQW Residuals for the Total Sample.

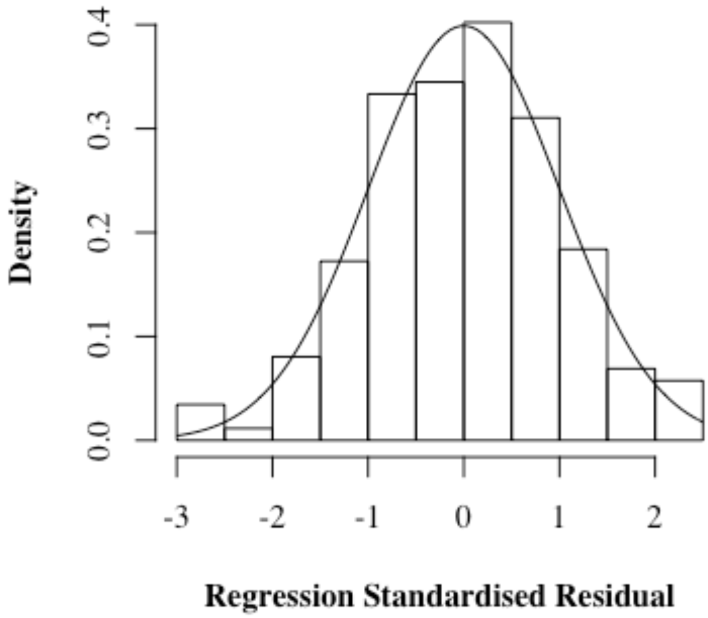


Figure G2

Histogram Showing the Distribution of the TFEQ Residuals for the Total Sample.

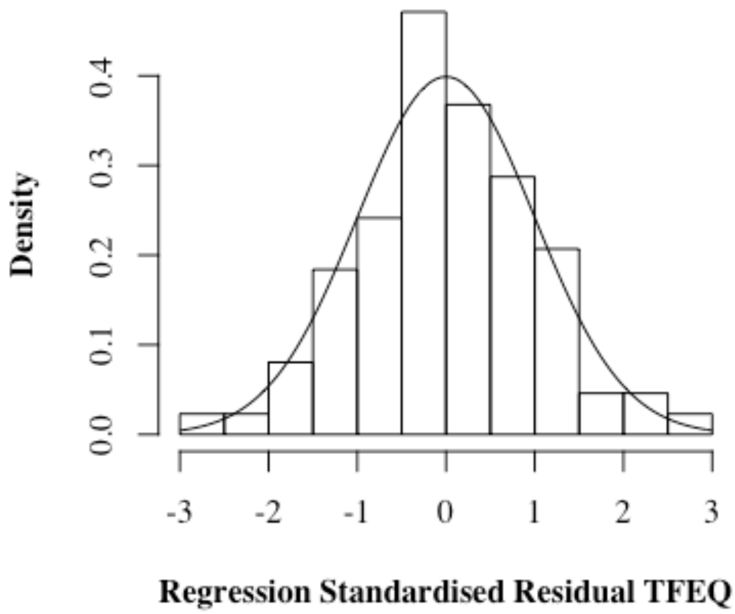
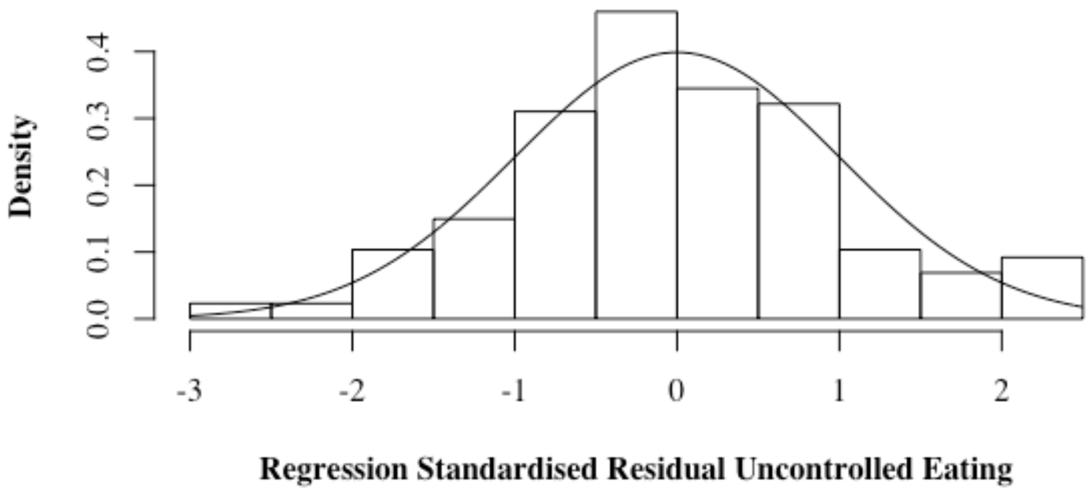


Figure G3

Histogram Showing the Distribution of the Uncontrolled Eating Residuals for the Total



Sample.

Figure G4

Histogram Showing the Distribution of the Emotional Eating Residuals for the Total Sample.

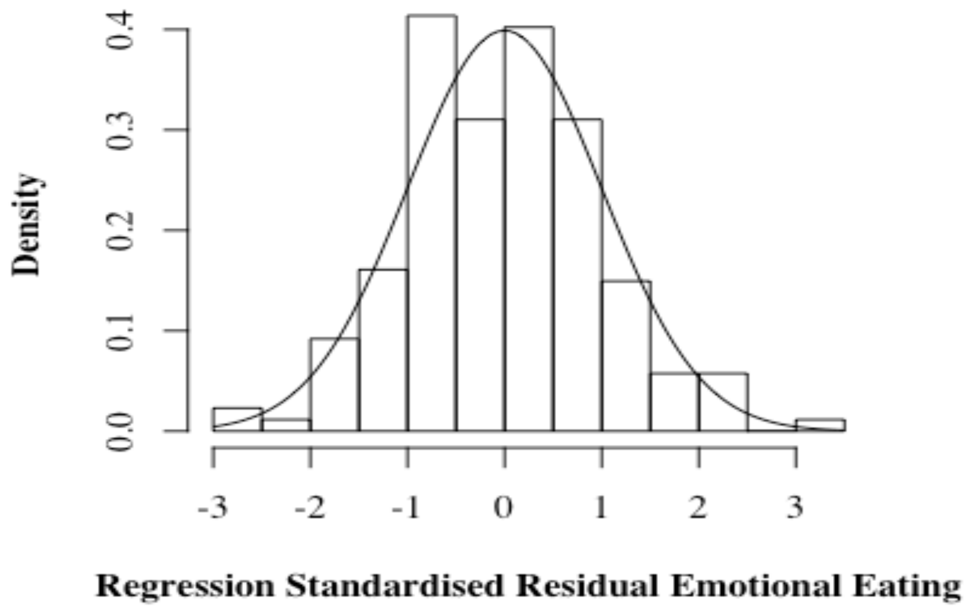


Figure G5

Histogram Showing The Distribution of BMI Residuals for the Total Sample.

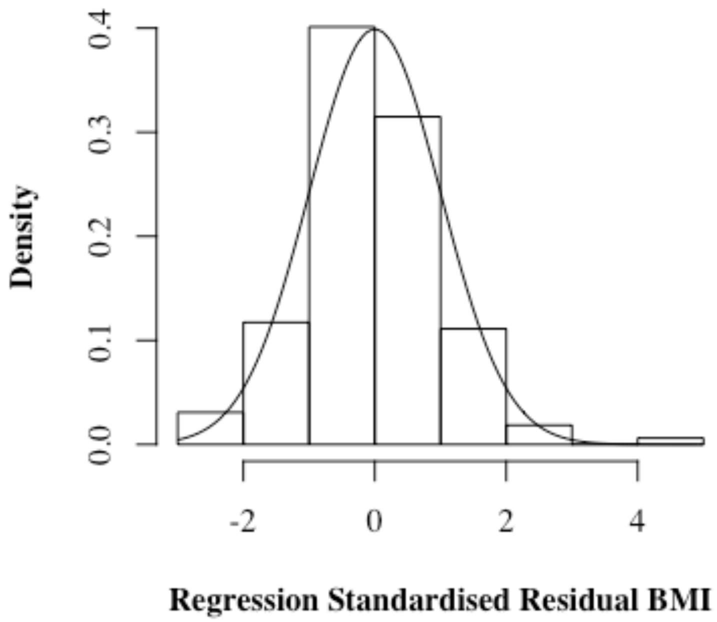


Figure G6

Histogram Showing the Distribution of Flexible Dietary Restraint Residuals for the Total Sample.

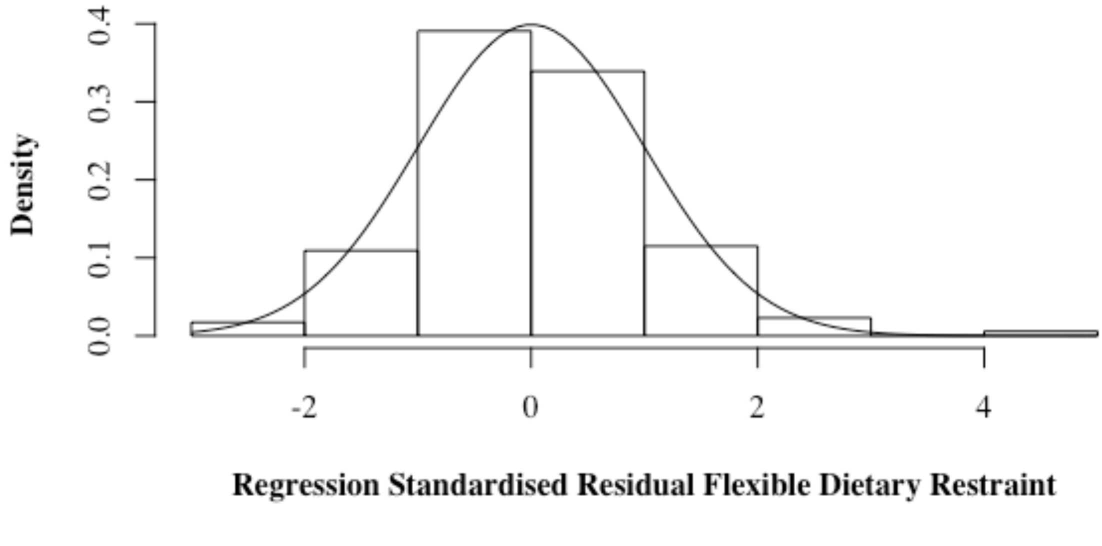


Figure G7

Normal Probability Plot of AAQW Residuals.

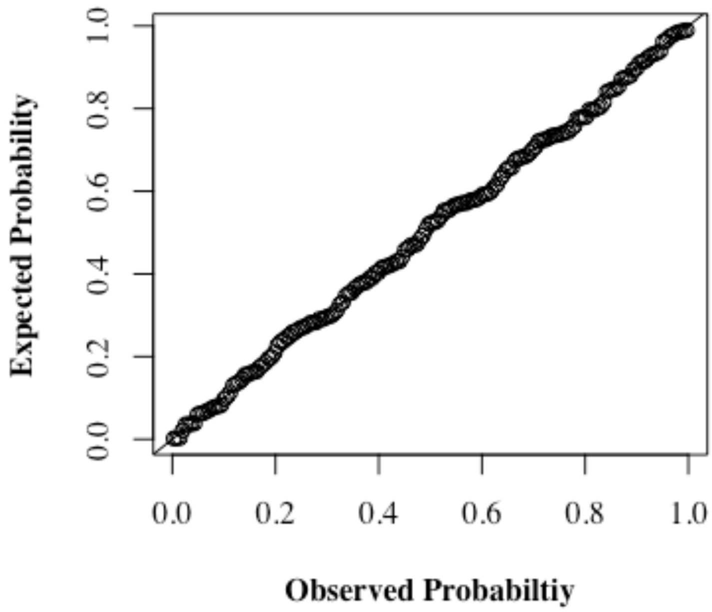


Figure G8

Normal Probability Plot of TFEQ Residuals.

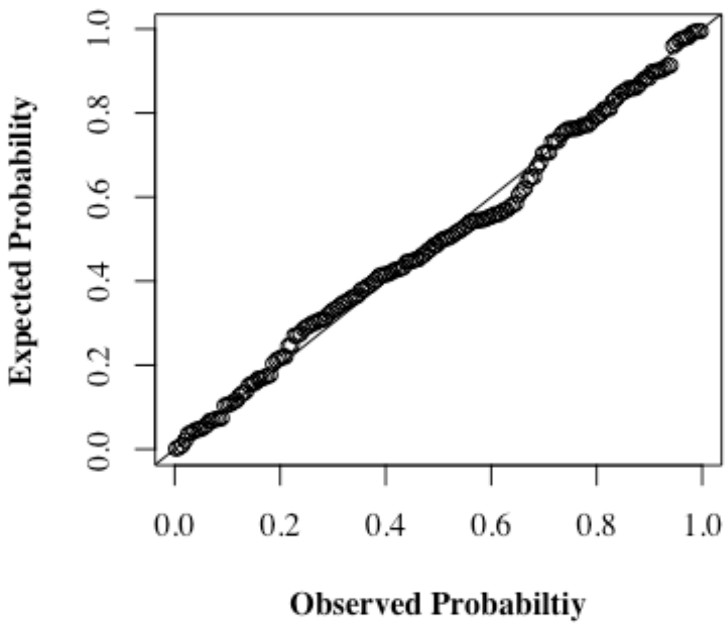


Figure G9

Normal Probability Plot of Uncontrolled Eating Residuals.

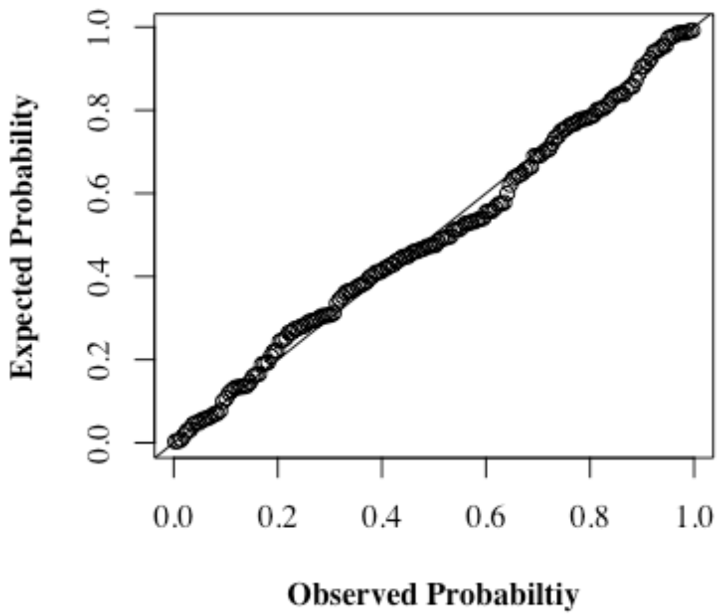


Figure G10

Normal Probability Plot of Emotional Eating Residuals.

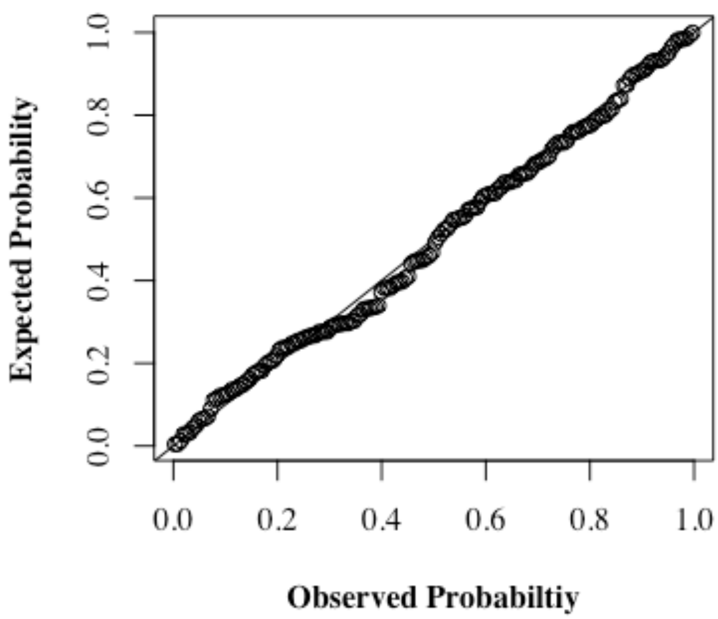


Figure G11

Normal Probability Plot of BMI Residuals.

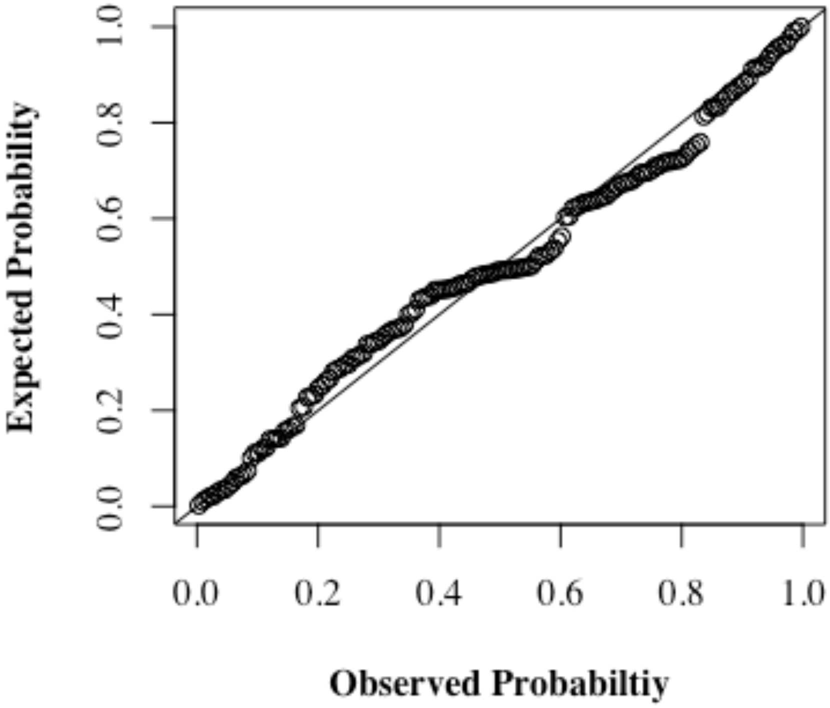


Figure G12

Normal Probability Plot of Flexible Dietary Restraint Residuals.

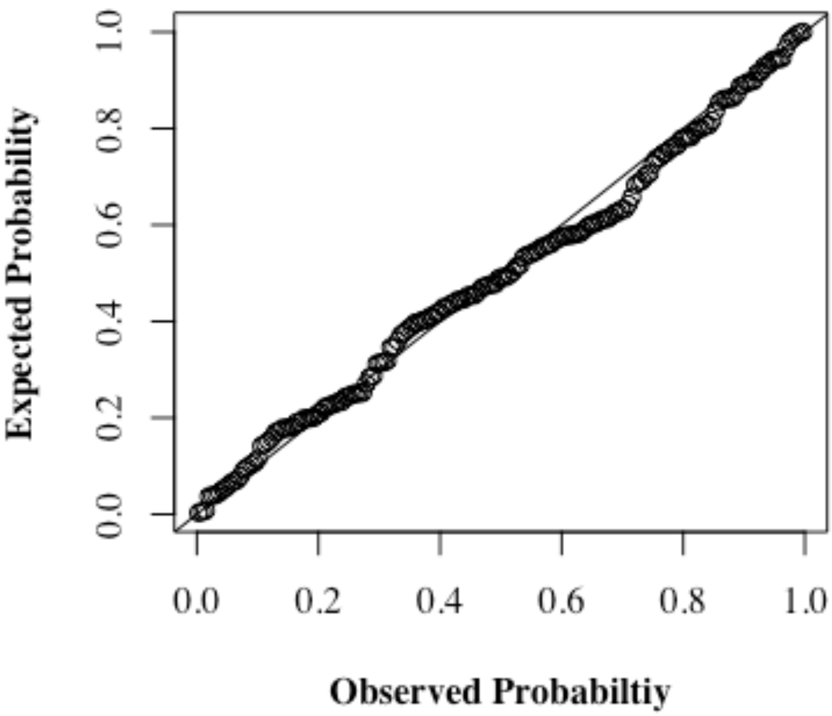


Figure G13

Standardised Residual Plot for AAQW.

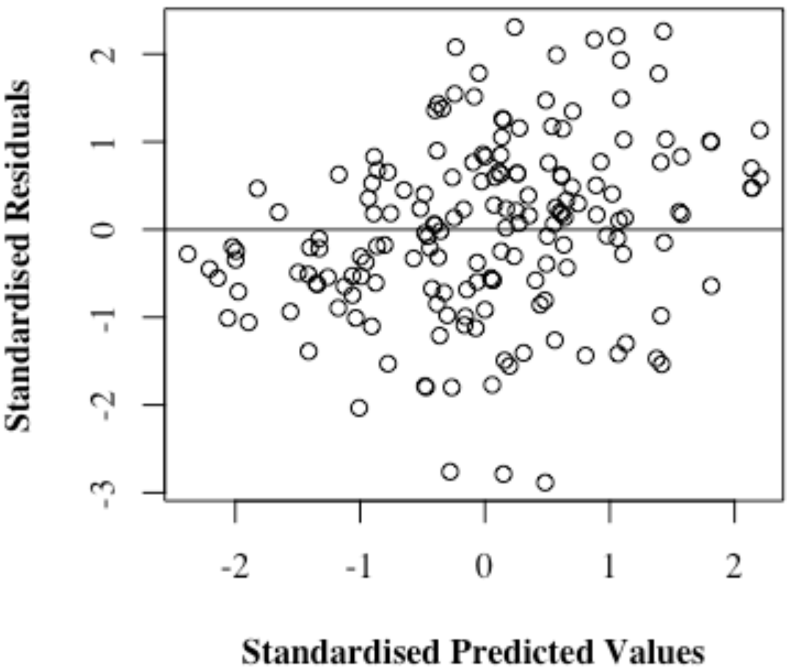


Figure G14

Standardised Residual Plot for TFEQ.

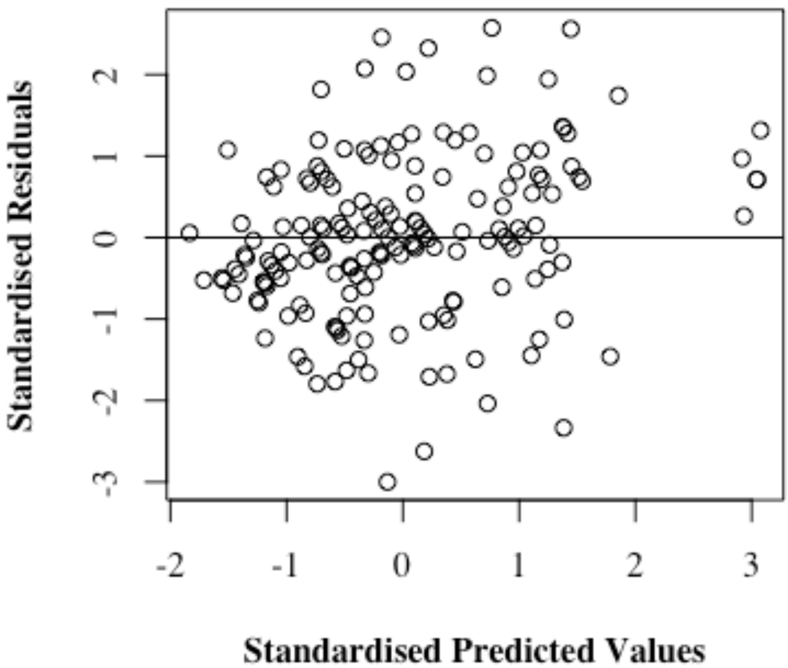


Figure G15

Standardised Residual Plot for Uncontrolled Eating.

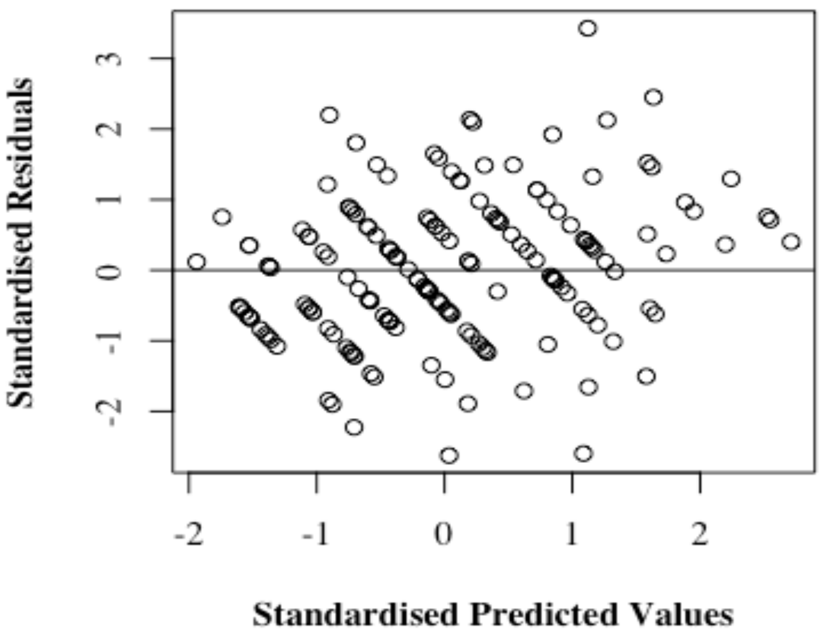


Figure G16

Standardised Residual Plot for Emotional Eating.

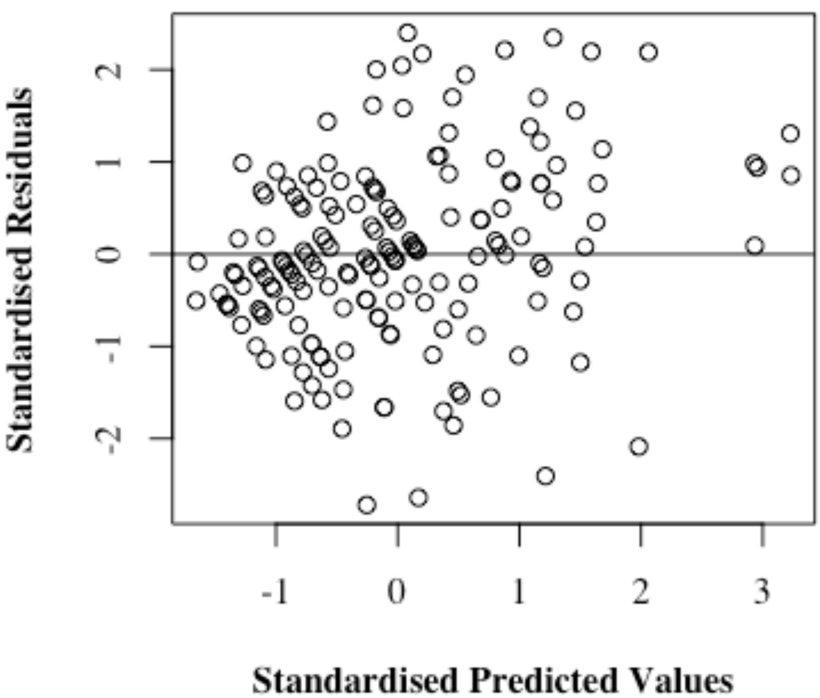


Figure G17

Standardised Residual Plot for BMI.

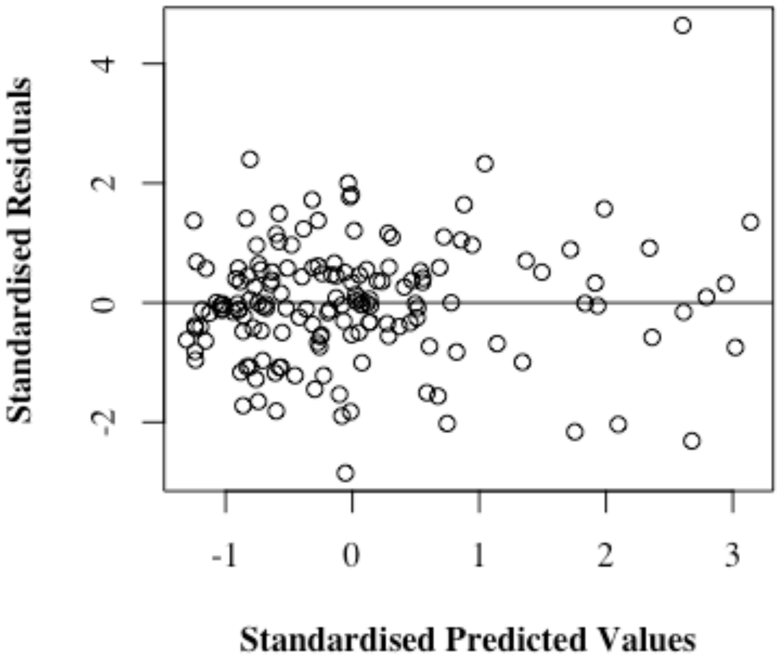


Figure G18

Standardised Residual Plot for Flexible Dietary Restraint.

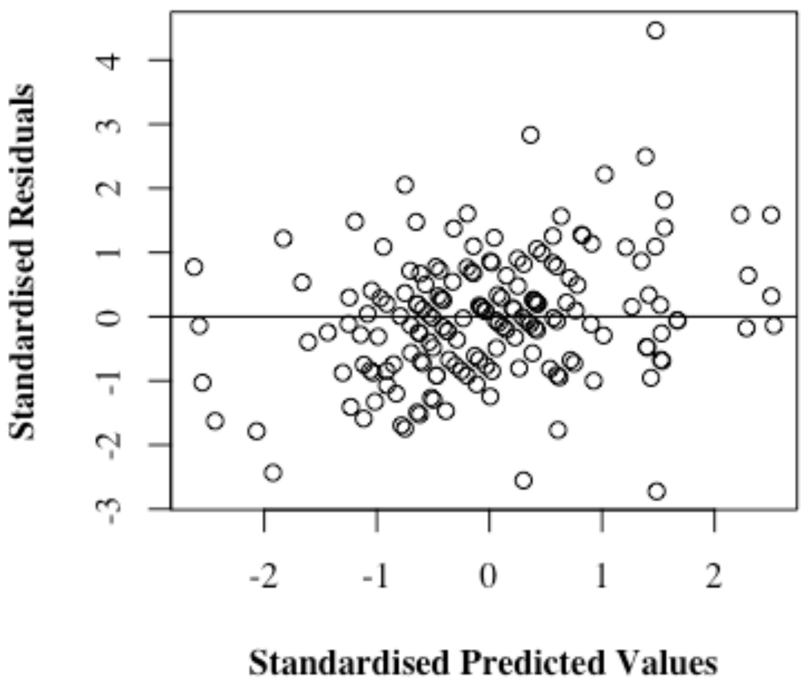


Figure G19

Scale-Location Plot of Squared Standardised Residuals and Fitted AAQW Values.

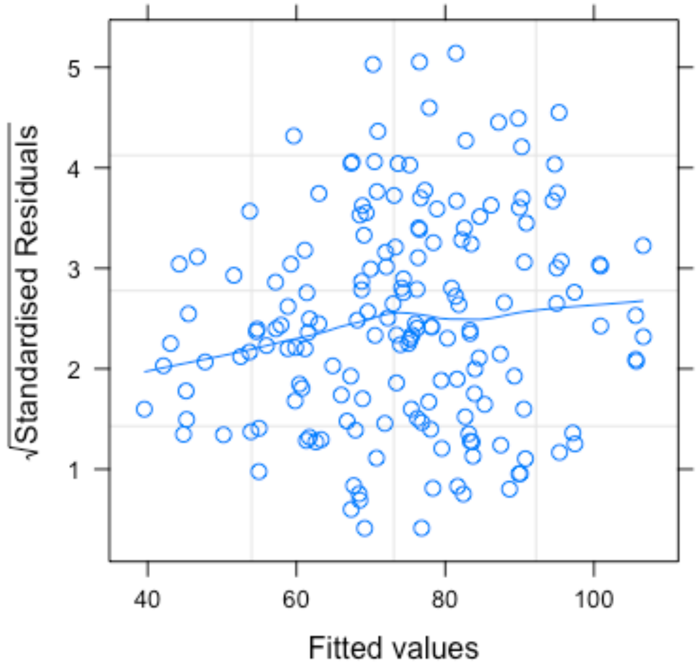


Figure G20

Scale-Location Plot of Squared Standardised Residuals and Fitted TFEQ Values.

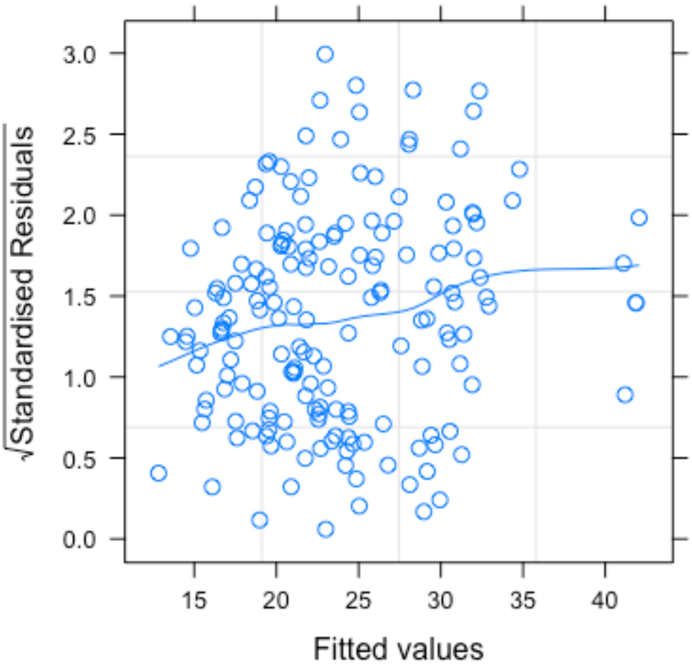


Figure G21

Scale-Location Plot of Squared Standardised Residuals and Fitted Uncontrolled Eating Values.

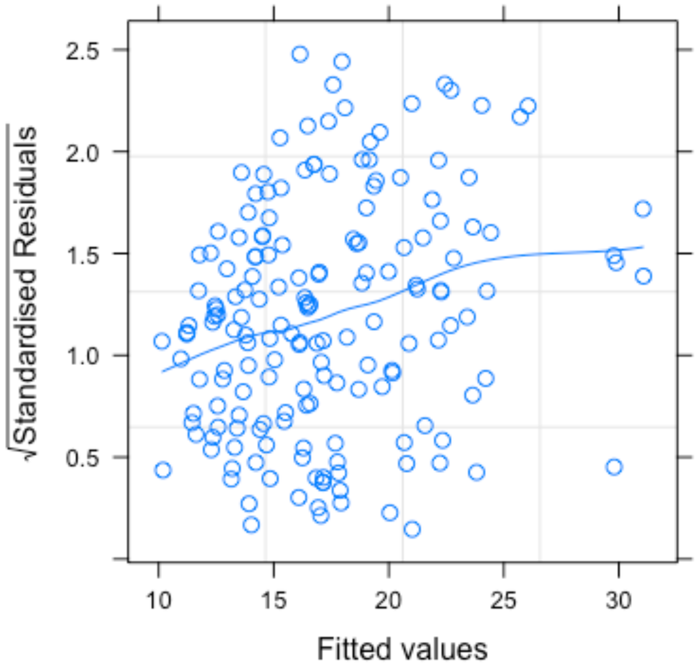


Figure G22

Scale-Location Plot of Squared Standardised Residuals and Fitted Emotional Eating Values.

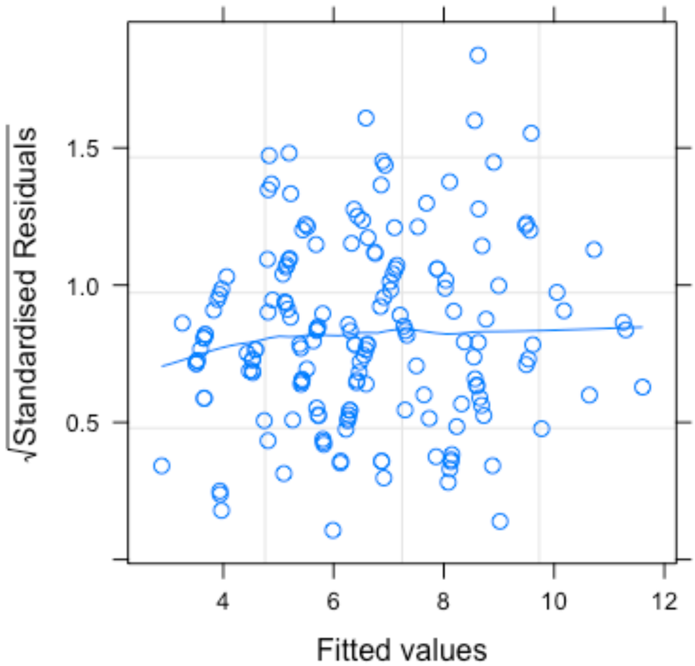


Figure G23

Scale-Location Plot of Squared Standardised Residuals and Fitted BMI Values.

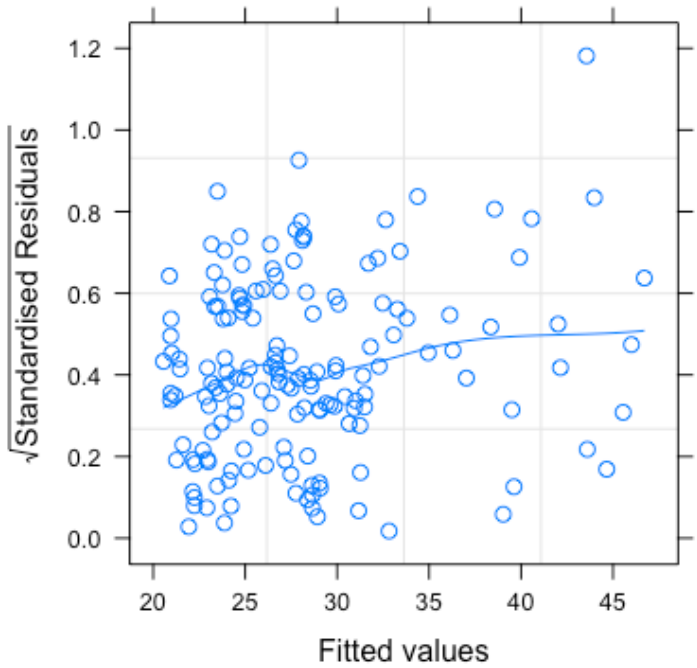
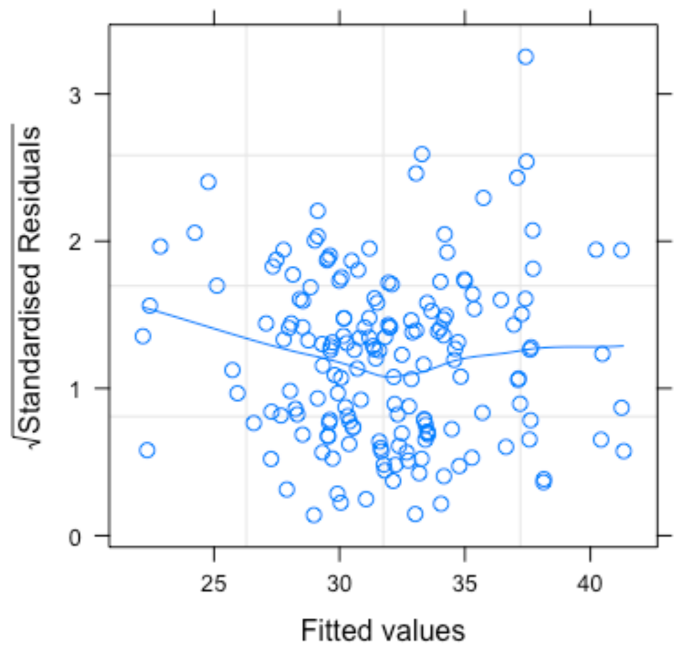


Figure G24

Scale-Location Plot of Squared Standardised Residuals and Fitted Flexible Dietary Restraint Values.

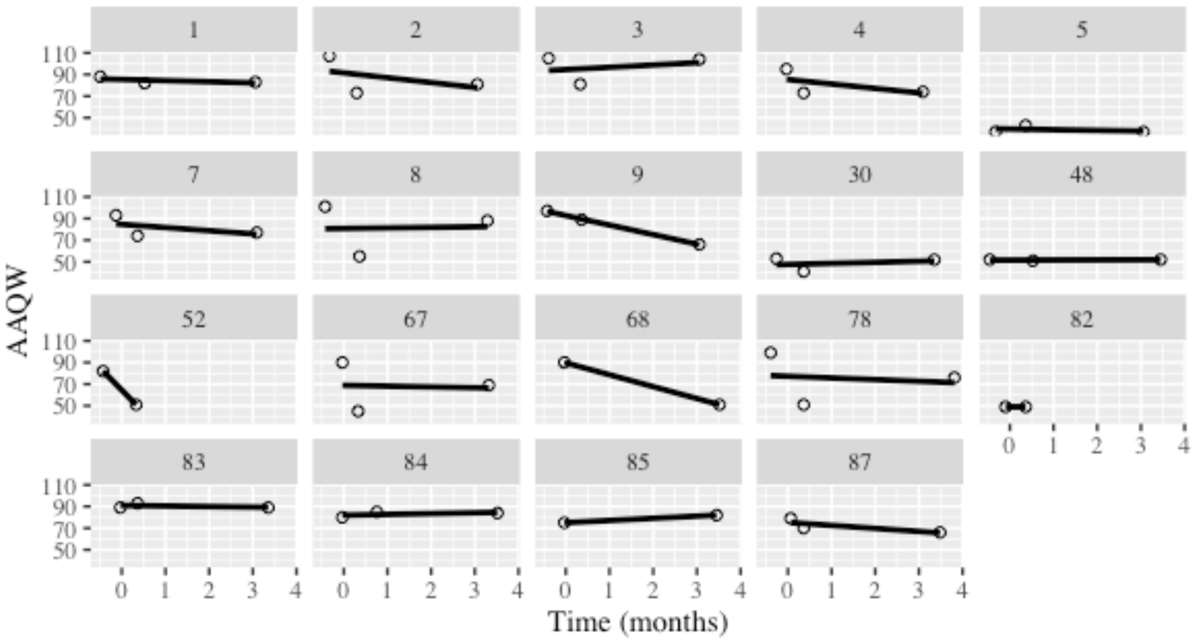


19. Appendix H: Fitted OLS Trajectories

Figure H1

Fitted OLS Trajectories for Retreat Group Participants AAQW Scores in the Current Study.

Figure H2



Fitted OLS Trajectories for Control Group Participants AAQW Scores in the Current Study.

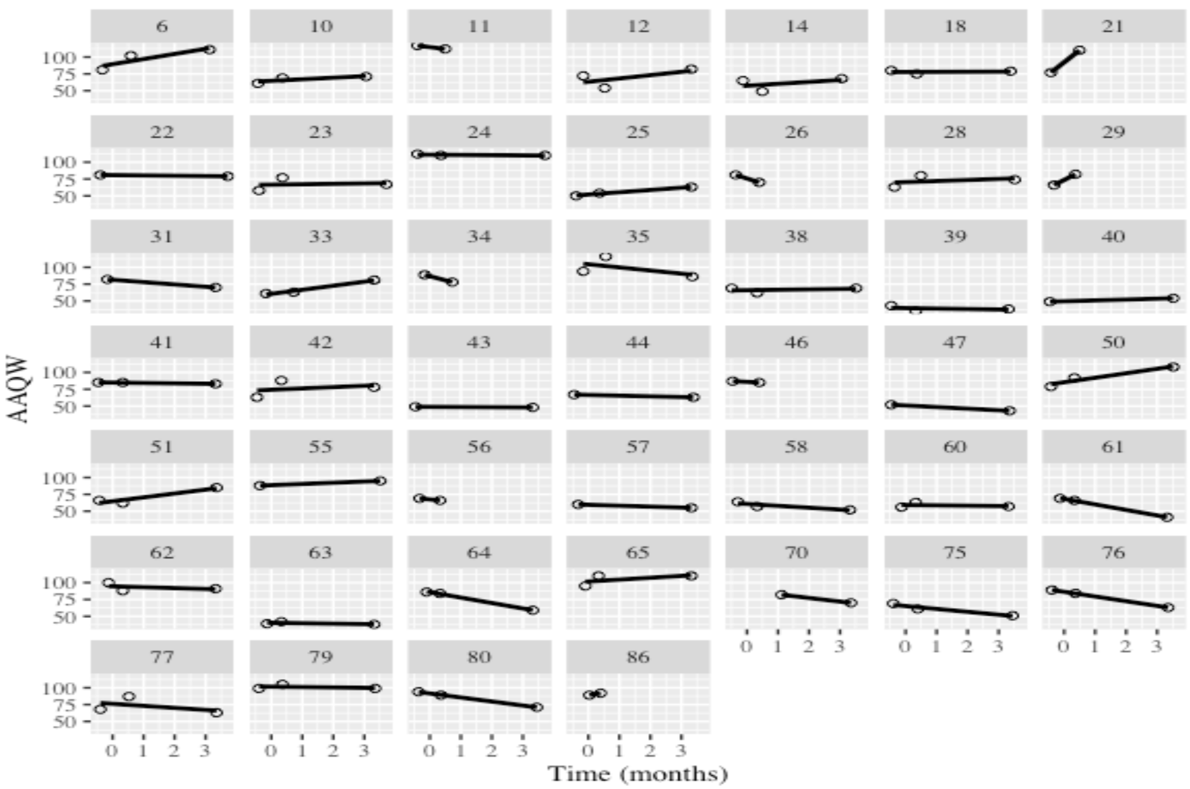


Figure H3

Fitted OLS Trajectories for Retreat Group Participants TFEQ-R18 Scores in the Current Study.

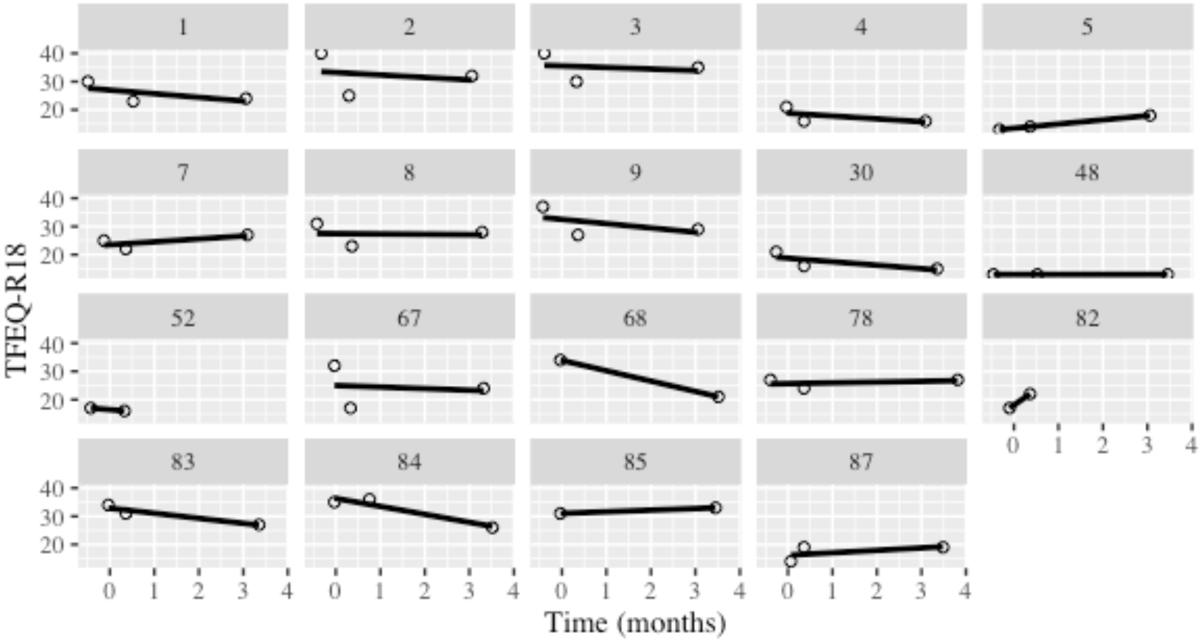


Figure H4

Fitted OLS Trajectories for Control Group Participants TFEQ-R18 Scores in the Current Study.

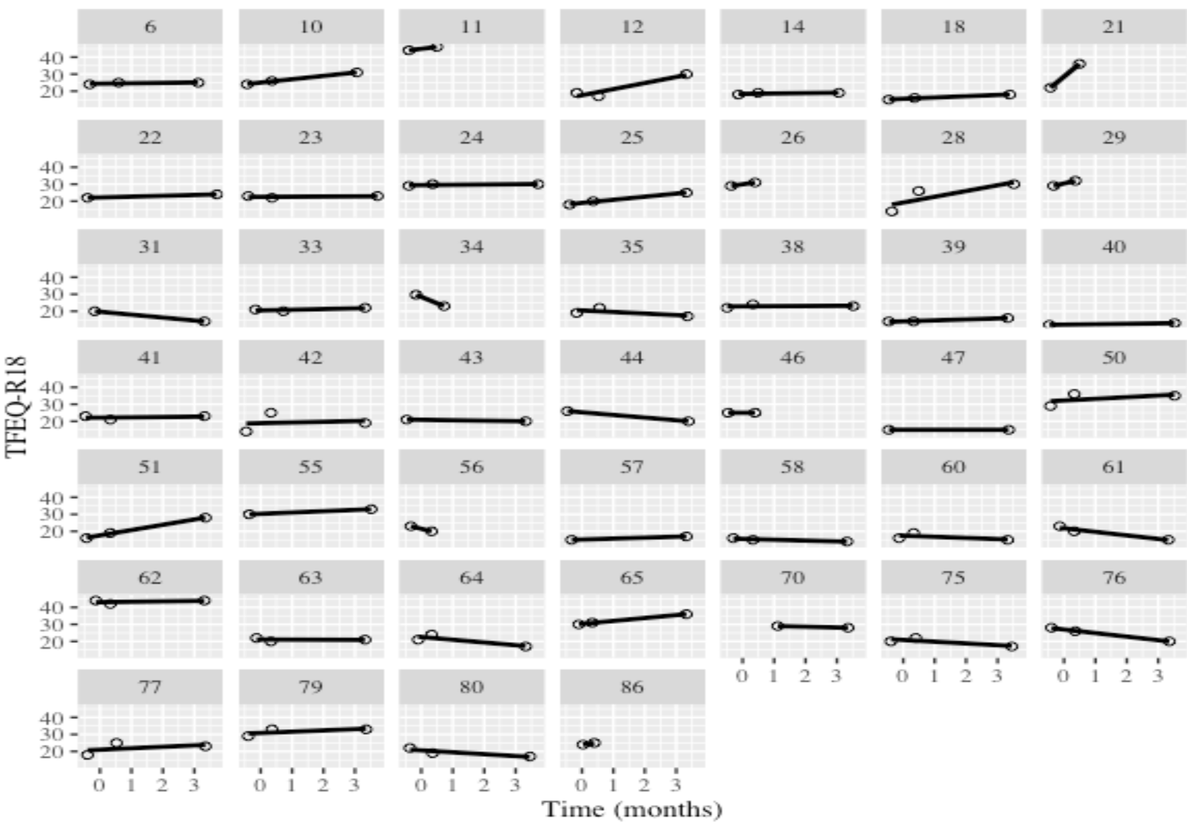


Figure H5

Fitted OLS Trajectories for Retreat Group Participants Uncontrolled Eating Subscale Scores in the Current Study.

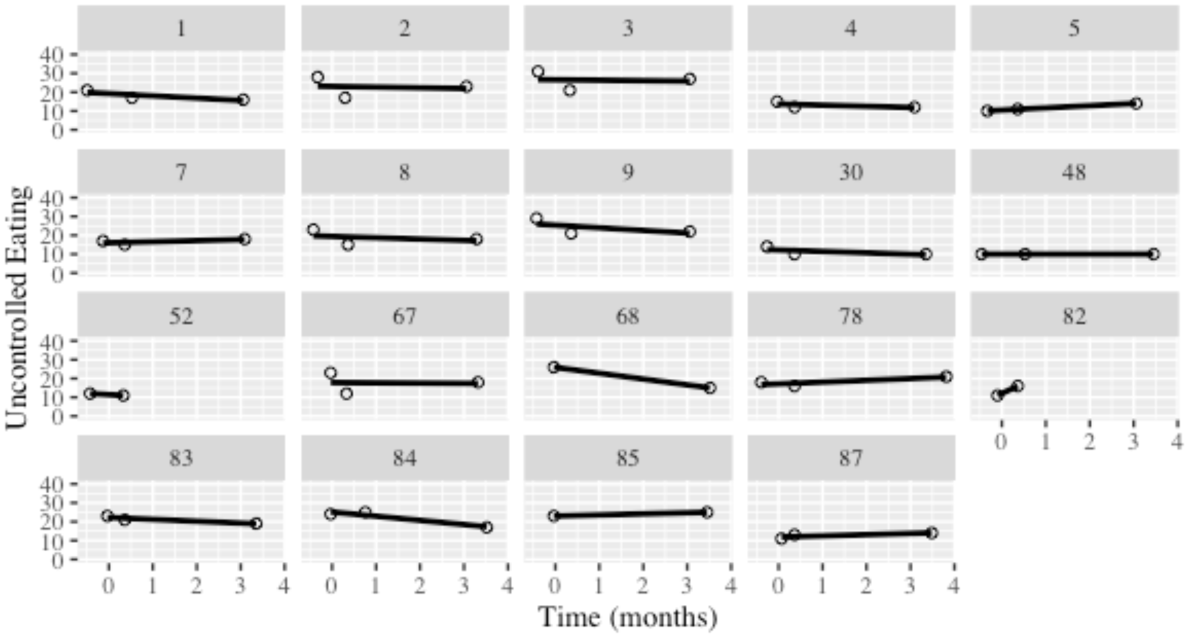


Figure H6

Fitted OLS Trajectories for Control Group Participants Uncontrolled Eating Subscale Scores in the Current Study.

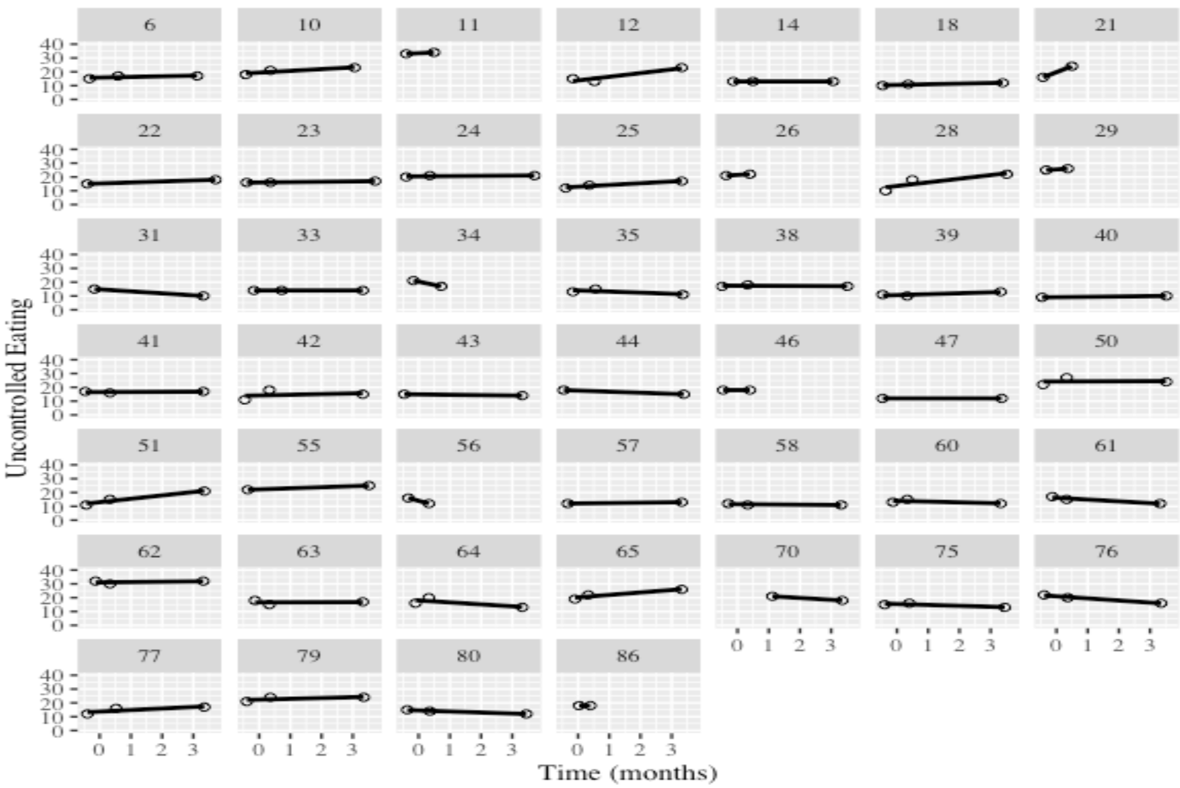


Figure H7

Fitted OLS Trajectories for Retreat Group Participants Emotional Eating Subscale Scores in the Current Study.

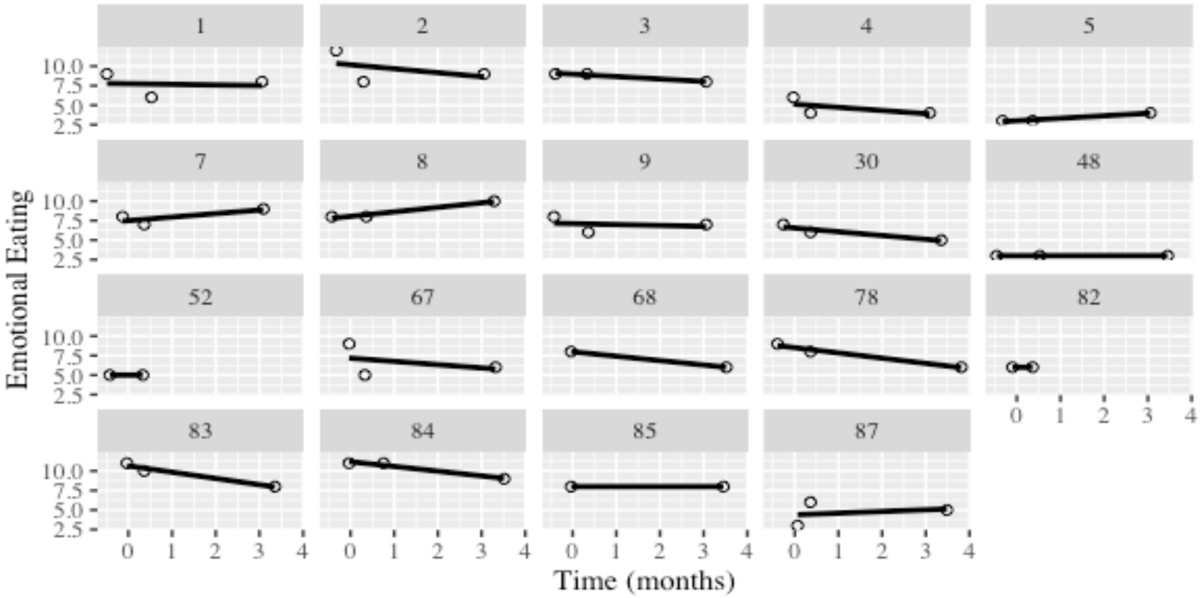


Figure H8

Fitted OLS Trajectories for Control Group Participants Emotional Eating Subscale Scores in the Current Study.

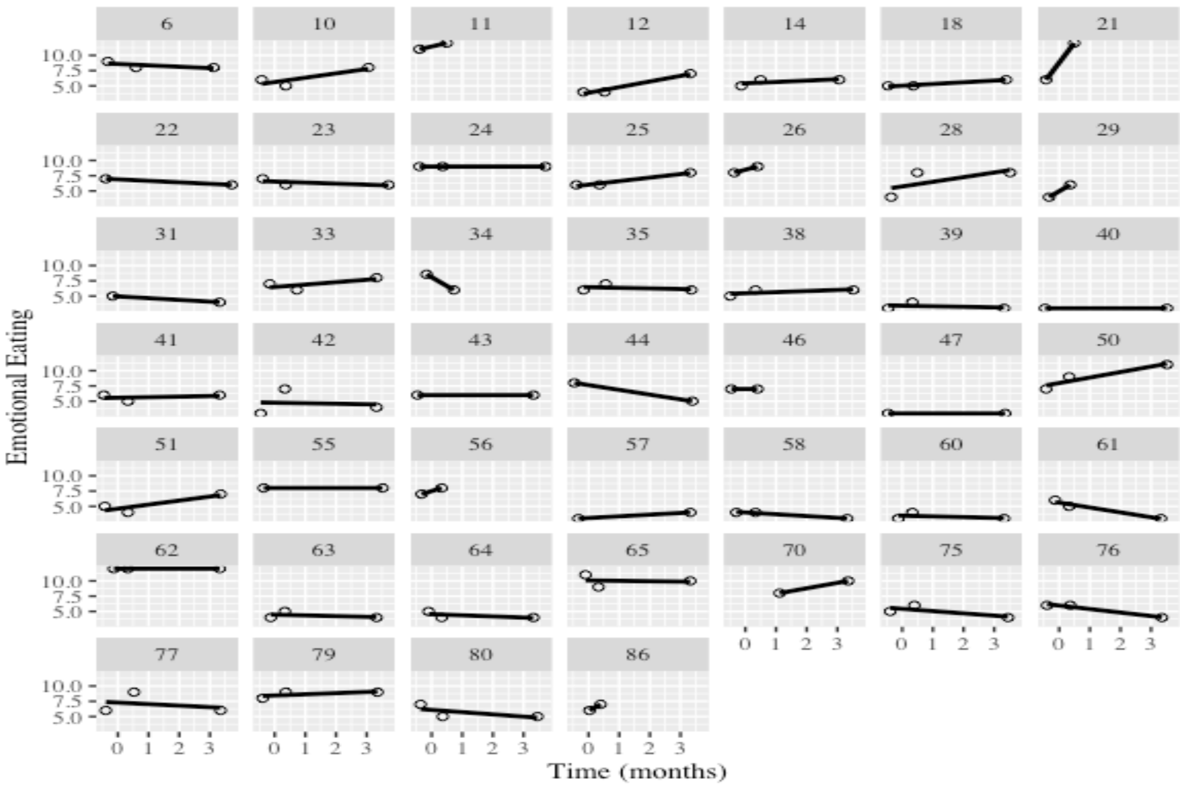


Figure H9

Fitted OLS Trajectories for Retreat Group Participants BMI in the Current Study.

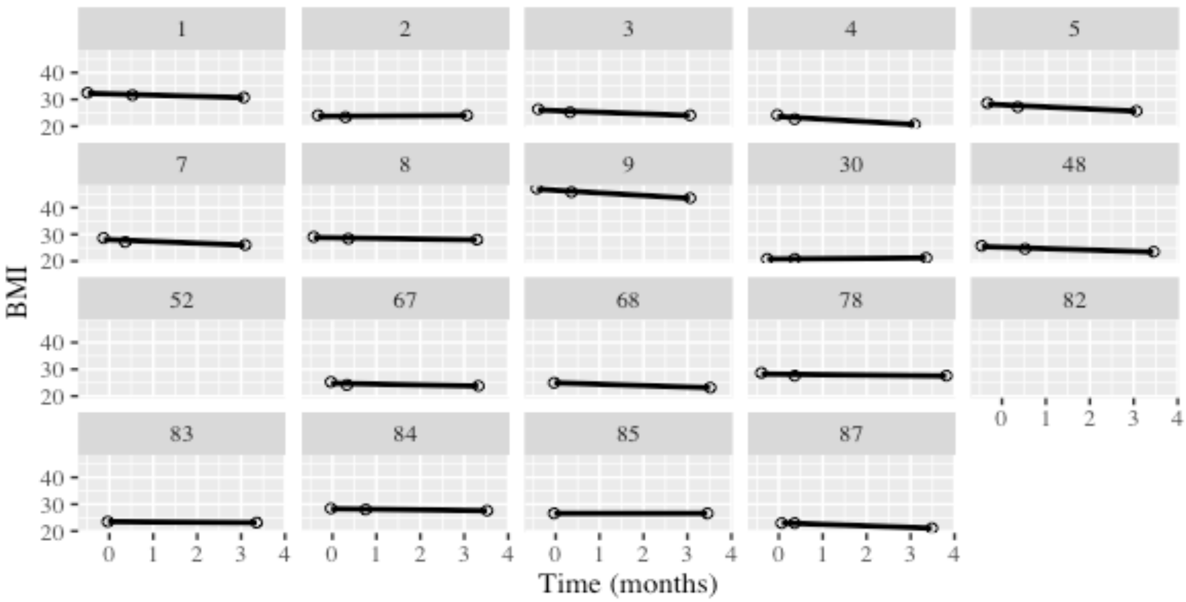


Figure H10

Fitted OLS Trajectories for Control Group Participants BMI in the Current Study.

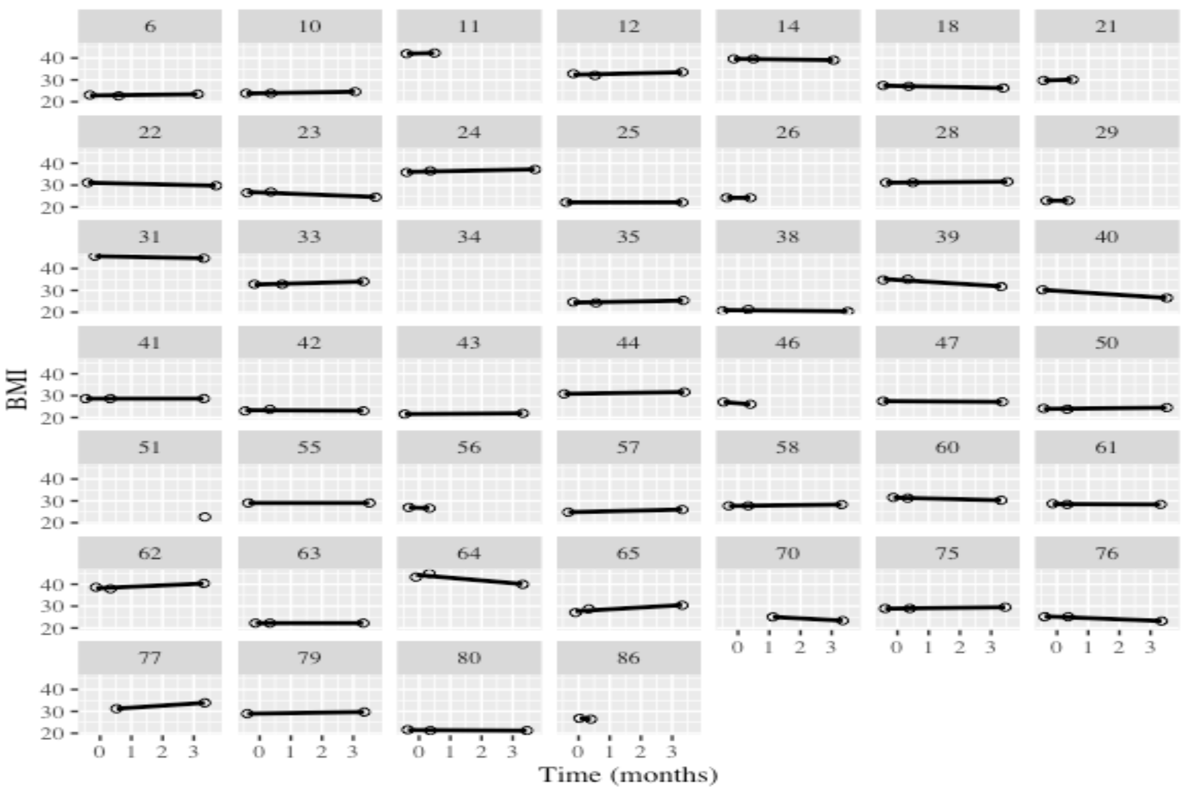


Figure H11

Fitted OLS Trajectories for Retreat Group Participants Flexible Dietary Restraint Scores in the Current Study.

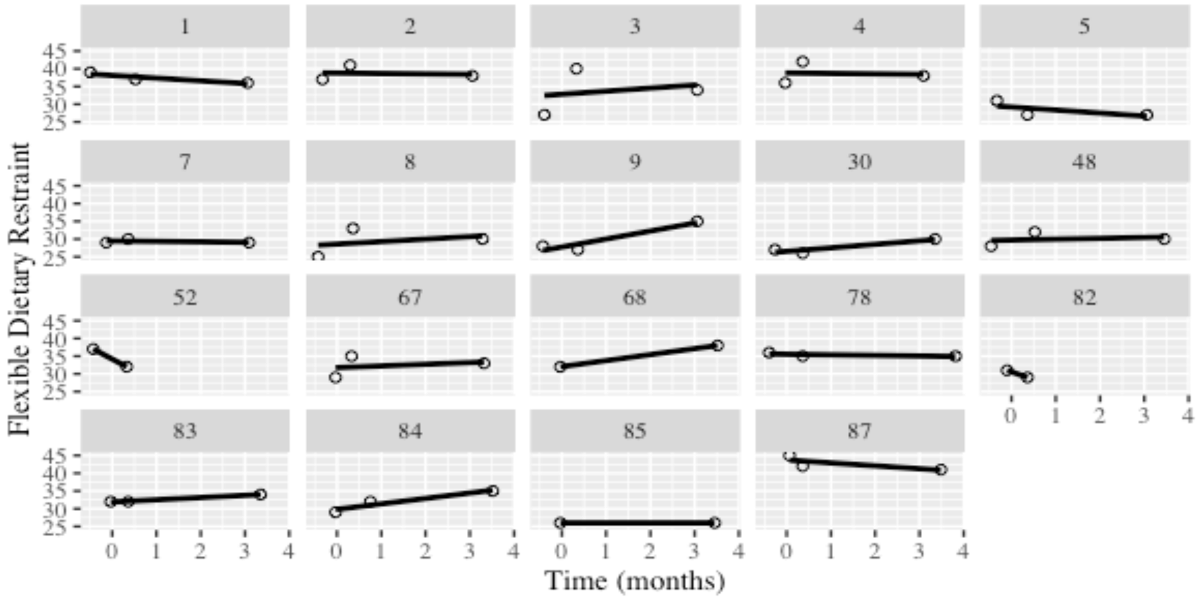
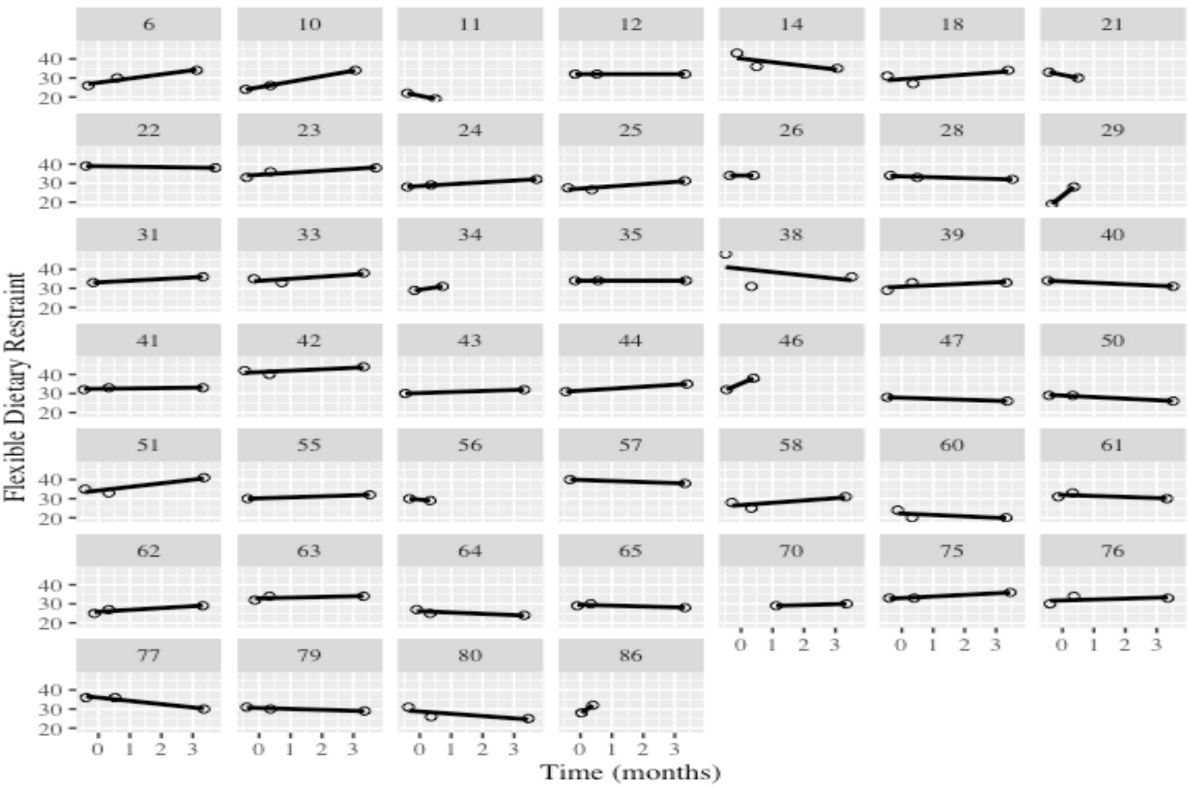


Figure H12

Fitted OLS Trajectories for Control Group Participants Flexible Dietary Restraint Scores in the Current Study.



20. Appendix I: Post-Intervention and Follow-Up Bivariate Correlations

Table I1

Correlations of Raw Scores at Post-Intervention Between AAQW, TFEQ, Uncontrolled Eating Subscale, Emotional Eating Subscale, Flexible Dietary Restraint, and BMI.

Variable	1	2	3	4	5	6
1. AAQW	-	.71***	.78***	.47*	.49	.34
2. TFEQ	.64***	-	.98***	.91***	.39	.12
3. Uncontrolled eating subscale	.58***	.98***	-	.80***	.52*	.09
4. Emotional eating subscale	.65***	.86***	.73***	-	.08	.16
5. BMI	.02	.21	.20	.18	-	-.39
6. Flexible dietary restraint	-.16	-.27	-.33	-.06	-.29	-

Notes. *** $p < .001$ (two-tailed); ** $p < .01$; * $p < .05$ significance level (2-tailed; Pearson correlation). Correlations for Retreat group are above the main diagonal line (top right) and Control group are below (bottom left).

Table I2

Correlations of Raw Scores at Follow-Up Between AAQW, TFEQ, Uncontrolled Eating Subscale, Emotional Eating Subscale, Flexible Dietary Restraint, and BMI.

Variable	1	2	3	4	5	6
1. AAQW	-	.76***	.68**	.75***	.09	.17
2. TFEQ	.71***	-	.97***	.82***	.39	-.03
3. Uncontrolled eating subscale	.63***	.98***	-	.66**	.38	-.03
4. Emotional eating subscale	.78***	.92***	.83***	-	.32	-.04
5. BMI	.11	.08	.08	.07	-	-.07
6. Flexible dietary restraint	.03	-.07	-.07	-.07	-.15	-

Notes. *** $p < .001$ (two-tailed); $^{**}p < .01$; $^{*}p < .05$ significance level (2-tailed; Pearson correlation). Correlations for Retreat group are above the main diagonal line (top right) and Control group are below (bottom left).

21. Appendix J: Thesis Case Study

As part of a Doctor of Clinical Psychology thesis, candidates are required to include a ‘Thesis Case Study’ which is examined as part of the clinical component of the doctorate. The case study speaks to the learnings the candidate has taken from the research conducted, and how these learnings have contributed to their clinical internship. This case study is included below.

Massey University
Clinical Psychology

CASE STUDY SIX

How my Doctoral Research Contributed to my Clinical Practice during my Internship within a Child and Adolescent Mental Health Service

Candidate : Natalija Damnjanovic
Clinical Psychology Programme Massey University
Student ID : 16462128
Setting: Kari Centre, Child and Adolescent Mental Health Service
Supervisor : Jo Levy

This case was completed during internship at Kari Centre 2020 and represents the work of the candidate

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Supervisor	**Student**
Jo Levy	**Natalija Damnjanovic**
Clinical Psychologist	***16462128***

Date : 10.11.20

CASE STUDY SIX

Research Case Study

Abstract

The present work outlines learnings I have taken from my experiences with my doctoral research and how they have applied to my work as an intern psychologist within a multidisciplinary community team at Kari Centre; a secondary Child and Adolescent Mental Health Service (CAMHS) in the Auckland District Health Board. This case study opens with an overview of my doctoral research, which focuses on the efficacy of an acceptance and commitment therapy-based (ACT) intervention for individuals who have undergone bariatric surgery, and their personal experiences of eating and body image pre and post weight loss. Attention is then given to how my research experience has informed and enhanced my work as an intern psychologist working with young people and their whānau in a community mental health setting. These reflections include strengthening my ability to conceptualise disordered eating within an ACT-based framework, understanding individual experiences that greatly differ to my own, and identifying the relationships between shame, connection, and healing.

Doctoral Research Overview

My doctoral research evaluates the effectiveness of an Acceptance and Commitment Therapy-based (ACT) intervention entitled, the Foundations of Healthy Living Retreat (FOHL), in enhancing health outcomes for individuals who have had weight-loss surgery. Individuals who have undergone bariatric surgery are those whose difficulty in managing their weight has resulted in significant health risks, reduced quality of life, and functional impairment. The study had a secondary aim to understand the experiences of post-weight loss surgery individuals leading up to, and following their decision to have surgery, with a specific focus on their personal journeys with food, eating, and body image. The following section will provide an overview of the research background, rationale, aims, methodology and results. By providing information about the research conducted, it is hoped that the reflections around my role as an intern psychologist will be properly contextualised.

Study rationale and aims

The increasing prevalence of obesity and its widespread consequences warrant significant attention. Fundamentally, its proximal causes include excess energy intake relative to energy expenditure (de Bruijn, Kremers, de Vries, van Mechelen, & Brug, 2006). While this notion is seemingly simplistic, the core factors that influence food intake and physical activity are more complex. To date, psychological theories have collectively demonstrated the influential role of a range of factors implicated in the development and maintenance of obesity. Specifically, high levels of experiential avoidance defined by efforts to avoid unwanted or unpleasant internal experiences have been found in obese populations. Relatedly, patterns of disordered eating including emotional eating, uncontrolled eating, and restrained eating (Lacey, 1986; Herman & Mack, 1975; McIntosh, Carter, Latner, & Wallace, 2006) have also been identified. Thus, interventions that target these areas are required in order to reverse the current rising obesity trends.

Currently, weight-loss surgery is considered the most successful treatment for obesity, with no other treatment leading to such marked and rapid weight reduction (Chang et al., 2014). Notwithstanding its short-term efficacy, weight regain is typical for a substantial portion of individuals within 2 years of surgery (Chang et al., 2014; Ferchak & Meneghini, 2004). Research suggests that poor long-term health outcomes of surgery may be attributable to unresolved disordered eating behaviours that underpin the etiology of obesity (Bocchieri, Meana, & Fisher, 2002). Thus, an investigation of the psychological interventions that address eating pathology is warranted in attempt to extend the outcomes of weight-loss surgery. Presently, the majority of research has centered on combining surgical weight-loss procedures with behavioural weight control interventions that focus on increasing adherence to dietary guidelines and regular physical activity (Carter & Jansen, 2012; Cooper et al., 2010; Dombrowski, Avenell, & Sniehott, 2010; Rudolph & Hilbert, 2013; Teixeira et al., 2015). Though such programs achieve short-term improvements in weight-loss, results are rarely maintained (Lillis & Kendra, 2014; Rudolph & Hilbert, 2013).

Evidence within the eating disorder literature suggests that ACT may be effective in enhancing weight-loss surgery outcomes given its principal focus on mitigating experiential avoidance; a concept closely related to disordered eating behavior (Hayes, 2004). From an ACT perspective, disordered eating patterns are conceptualized as attempts to avoid or relieve unwanted emotional experiences (experiential avoidance); therefore, facilitating acceptance of such experiences is fundamental to the successful treatment of eating pathology (experiential acceptance) (Hayes, 2004). Recent studies have supported this theory by demonstrating weight related experiential avoidance to mediate disordered eating behaviours in samples of overweight and obese individuals (Weineland, Hayes, & Dahl, 2012). However, to our knowledge only two studies have investigated the efficacy of ACT in augmenting the effects of weight-loss surgery and no studies have examined this in New

Zealand (Weineland, Arvidsson, Kakoulidis, & Dahl, 2012; Weineland, Hayes, & Dahl, 2012).

This research project was designed to address this limitation and contribute to the bariatric surgery literature from a psychological perspective, both internationally and within a New Zealand context. This was to be achieved by evaluating how a 4-day ACT-based intervention (the FOHL Retreat) could impact the psychological outcomes and BMI of individuals who have had weight-loss surgery, specifically across the measures of weight-related experiential avoidance, emotional and disinhibited eating, and flexible dietary restraint.

The research findings have the potential to enhance the understanding of the general public, health practitioners, and researchers in New Zealand with regard to the psychological mechanisms of obesity. By increasing awareness and understanding, these findings could inform the future design of psychological interventions that meaningfully address these mechanisms and in doing so, facilitate improved health outcomes for individuals who have undergone weight-loss surgery.

Methodology and results

A mixed-method approach was taken to address the study aims through both survey data and qualitative open-ended questions.

Participants

The final sample size for the study was 87, of which 28% (n = 24) were in the Retreat group and 72% (n = 63) were controls. Within this sample, 87% of participants were female (n = 76) and 13% were male (n = 11). Approximately 89% of participants identified as New Zealand European (Pakeha) and 17% as Māori. Participants were recruited from Weight Loss Surgery Limited, a private weight-loss surgery clinic based in Hamilton and Wellington. Participants were invited to participate if they had weight loss surgery between 6 months and

2 ½ years ago and were not involved in any weight-loss focused programme during the data collection period, apart from the Foundations of Healthy Living Retreat.

Procedure

Recruitment ran for 10 months between December 2018 and September 2019. The Director of Weight Loss Surgery Limited and the FOHL Retreat sent a list unique numerical IDs and surgery dates of individuals who had weight-loss surgery between 6 months ago and 2 ½ years ago and not attended the FOHL Retreat. The list was divided into those who had signed up for a Retreat over the data collection period, and those who had not. As Retreats were held on a monthly basis, an online research flyer with a link to the study's information sheet and survey was sent by the Director, to the Retreat attendees two weeks before their Retreat. The same flyer and survey link were emailed to 8 potential controls randomly selected from the list each month. However, due to the large sampling frame of potential controls and the limited recruitment success during the first two months of data collection, this method was revised in March 2019 to ensure all individuals in the sampling frame were approached by random selection over the remaining monthly waves of data collection. Additionally, an advertisement for the research was placed in Weight Loss Surgery Limited's monthly newsletter through which a small number of control participants expressed interest in participating.

Participants completed an online, anonymous survey at three different time points, designed by the researcher and hosted on a Qualtrics survey system. The survey included questions focusing on participants' demographic information including time since surgery and surgery type. Weight-related experiential avoidance was measured using the The Acceptance and Action Questionnaire for Weight-Related Difficulties (AAQW;

Lillis & Hayes, 2008). Eating behaviour, specifically emotional eating and disinhibited eating, was measured using The Three Factor Eating Questionnaire, Revised 18-

item version (TFEQ-R18; Karlsson, Persson, Sjostrom, & Sullivan, 2000). Flexible dietary restraint was measured using a subscale from the original Three Factor Eating Questionnaire (Westenhoefer, 1991). Finally, BMI was collected based on self-reported weight and height.

Surveys were administered at baseline, post-intervention, and 3 months follow-up. As a token of appreciation, participants were sent a $20 petrol voucher. Qualitative questions were also added at the end of the first survey to further understand participants relationship to body image, food, and eating and how this was impacted by weight-loss surgery and the Retreat (for those who attended).

Ethics

The current study complied with the Massey University Code of Ethical Conduct for Research, Teaching, and Evaluations involving Human Participants (Revised Code; Massey University, 2017). Full ethical approval was applied for in August 2018 and granted on October 17th 2018 by the Massey University Health Ethics Committee: Southern A (MUHEC). Additional Health and Disability Ethics Committee (HDEC) approval was not required as the research was determined to be a minimal risk observational study and thus out of scope for review (Health and Disability Ethics Committee, 2018).

Data analysis

Quantitative data analysis was completed using R version 3.5.1 (R Core Team, 2019). The six main hypotheses around the Foundations of Healthy Living Retreat were addressed through multilevel modelling and repeated-measures ANOVA. Hypotheses 7 and 8 were assessed through mediation analyses. These hypotheses were as follows:

Hypothesis 1. Participants who attend the Foundations of Healthy Living Retreat will show larger reductions in weight-related experiential avoidance relative to controls.

Hypothesis 2. Participants who attend the Foundations of Healthy Living Retreat will show larger reductions in disordered eating behaviours relative to controls.

Hypothesis 3. Participants who attend the Foundations of Healthy Living Retreat will show larger reductions in cognitive restraint compared to controls.

Hypothesis 4. Participants who attend the Foundations of Healthy Living Retreat will show larger reductions in uncontrolled eating compared to controls.

Hypothesis 5. Participants who attend the Foundations of Healthy Living Retreat will show larger reductions in emotional eating relative to controls.

Hypothesis 6. Participants who attend the Foundations of Healthy Living Retreat will show greater reductions in Body Mass Index (BMI) relative to controls.

Hypothesis 7. Improvements in disordered eating will be partially mediated by changes (reductions) in experiential avoidance.

Hypothesis 8. Improvements in BMI will be partially mediated by changes (reductions) in experiential avoidance.

Inductive thematic analysis, as per Braun and Clarke's (2006) guidelines, was used to carry out the qualitative analysis of the open-ended question responses. Braun and Clarke (2006) suggest that thematic analysis offers an accessible, systematic and theoretically flexible approach to analysing qualitative data; thus, it was considered an appropriate method for the present work. Thematic analysis has been previously used to investigate bariatric surgery indivduals' experiences of surgery and its physical and psychosocial impacts (Bocchieri et al., 2002; Epiphaniou & Ogden, 2010; Ogden et al., 2006).

An inductive and semantic approach was utilised to avoid potential assumptions and biases and to ensure the findings were grounded in participant responses. Themes were derived from the explicit meanings of the data and the researcher did not attempt to extend beyond the text response for interpretation. This was chosen given the lack of opportunity to explore response meanings and intent through reciprocal conversation with participants. In line with the Braun and Clarke's (2006) thematic analysis method, transcripts were firstly read and then re-read, to allow for familiarisation with the data. Initial codes of interest were then generated based on commonality and saliency of responses across the data. These initial codes were organised into potential themes and were reviewed and refined, ensuring consistency across the entire dataset. Finally, themes were named and defined with a written analysis completed to accompany each theme identified.

Results

Quantitative Results. Retreat participants reported finding their experience of the Retreat useful and viewed it positively. Primarily, Retreat participants reported reductions in weight-related experiential avoidance, disordered eating, and BMI, all of which were greater than those observed in the control group. Based on the multilevel models and mixed ANOVA's, these results suggested the Retreat was useful in contributing to short term change in these variables. There was no significant effect of the Retreat on flexible dietary restraint. Weight-related experiential avoidance fully medicated the relationship between the Retreat and eating behaviours, and partially mediated the relationship between the Retreat and BMI. These findings suggest that improving eating behaviour and BMI can be achieved by approaching one's own weight-related internal experiences with greater psychological flexibility and acceptance. This provides support for further developing and disseminating ACT-based interventions that aim to enhance experiential acceptance and psychological flexibility in the weight-loss surgery population.

Qualitative results. Key themes were identified pertaining to participant experiences of food, eating, and body image and their perspectives on how weight-loss surgery impacted these areas. These themes were: 1) Relationships to Food and Body Weight Leading up to Surgery, 2) Impacts of Weight Loss Surgery, 3) A Work in Progress, and 4) Impacts of The Foundations of Health Living Retreat. Subthemes were identified to capture the main perspectives that were evident within each of the four broader themes. A complicated relationship to food and body image characterized by judgment, preoccupation, stigma, and suffering encompassed a variety of reported experiences. Inability to sustain weight-loss through dieting was common and participants frequently interpreted this as their own failure. For many, weight-loss surgery was viewed as a saving grace, the window to a new self, distinguished by the resolve of chronic physical health issues and a restored sense of control in one's relationship to food. Nevertheless, participants continued to grapple with the internal experiences of the ever-present "component between the ears," (the mind). In particular, they expressed ongoing fear and self-judgment that remained within, fuelled by pre-surgery memories of unhealthy eating behaviours and longstanding shame. Those who engaged in the Retreat reflected how their self-perspectives expanded through developing greater insight, awareness, and self-compassion. This, in combination with the power of a collective experience at the Retreat, appeared to motivate and mobilise participants to continue pursuing personal health. Finally, participants identified the importance of long-term support, particularly psychological and dietary, to help with managing ongoing challenges and maintain positive lifestyle changes post-surgery.

Clinical Psychology Internship

My internship began in February 2020 with the Kari Centre, a Child and Adolescent Mental Health Service (CAMHS), at the Auckland District Health Board. I had previously completed a 120-hour placement in the neurodevelopmental team, a small sub team of the service. Therefore, I had some familiarity with the service as a whole, but no prior experience of the intensity, variability and high risk work within the community team. The Kari Centre services the Central Auckland catchment area and contains several main teams and sub teams who work with young people and their whānau aged 0-18 years of age presenting with a moderate to severe mental health issue. The observations made below are representative of my work with youth aged 10-18 presenting with complex mental health needs that cause significant impairment in daily functioning and/or serious risk issues. They include reflections on the relationship between experiential avoidance and suffering in the context of eating disorders, engaging with those whose experiences differ from my own, and finally, the role of shame and connection in healing.

Experiential avoidance and suffering

Experiential avoidance, that is, efforts to avoid unwanted or difficult internal experiences, was a key variable in my research. Results showed the influential role of experiential avoidance in maintaining disordered eating behaviours post-bariatric surgery. Participants relied on food for immediate comfort, pleasure, and distraction from difficult emotions they felt unable to tolerate whilst also recognising the long term suffering this caused by increasing self-judgment, shame, perceived failure, and overall reduced quality of life.

These participant accounts provided me with valuable insight around the function of disordered eating which has proven beneficial when working alongside adolescents with eating disorders this year. It has informed the way I approach eating disorder assessments, that is, with an aim to understand the function for the young person in front of me. I noticed this was an area frequently overlooked with eating disorders in comparison to other presentations, as assessment of eating behaviours and medical risk were understandably prioritised. Thus, the ACT learnings I gained from my research helped me to develop short questions that proved effective in eliciting the core function of clients' problematic eating patterns.

This became an area of relative confidence for me during my internship, which stood in contrast to the lack of confidence and competence I felt in most other areas of child assessment and treatment when I started. I have since learned that despite lying on opposite sides of the eating spectrum, these behaviours share similar underpinnings in that both can be conceptualised as emotionally avoidant behaviours that temporarily block, distract from, or suppress anxiety, loneliness, sadness, or anger.

The process of exploring the relationship between emotional avoidance and disordered eating has shown multiple benefits. For example, clients have developed greater insight into their eating disorder which in turn, has built motivation for positive change. Second, the large role experiential avoidance plays in maintaining eating disorders has guided my inclusion of emotional acceptance as a key treatment target in eating disorder treatment alongside the more 'practical' re-feeding component. This has involved practicing mindfulness of emotions, and experiential self-as-context exercises in session that promote defusion from eating disordered thoughts. One of the clients I worked with reported greater tolerance of emotional discomfort which is particularly relevant in the re-feeding stage of treatment, where discomfort generally intensifies. Another, who incorporated emotional acceptance practice after dinner when purging urges were strongest, reported a substantial reduction in purging behaviour after 3 months.

Working with different experiences to my own

Throughout my research, I have developed a greater awareness of the differences in experiences I have had with body image, food, and eating, to those of my research participants. During the design phase of the research, I visited the Foundations of Healthy Living Retreat to observe the programme implementation. I became increasingly aware of the various degrees of impact and influence of weight stigma, the thin ideal and overvaluing shape on participants self-perception and relationships with food. While I grew up cognisant of society's overemphasis on shape as a measure of self-worth, I had never experienced the trauma of ongoing discrimination or judgment for my body shape that so many participants described.

As a result, I questioned my right to embark on this area of research, which was temporarily emphasised by participants' comments such as, "You must never have to worry about your weight." As my research progressed and I reached the qualitative analysis phase, I gradually adjusted the way I perceived these differences as I also became more aware of the experiential differences that existed between participants. Self-doubt transitioned to acceptance as I was able to use my awareness of difference to acknowledge and critically reflect upon the ways in which this would inevitably influence the framework within which I interpreted clients' experiences.

I consulted with my two supervisors during analysis and both reviewed the themes I had drawn from the data. My supervisors helped me identify, reflect, and rectify any assumptions or generalisations I had unintentionally made from participant statements. By doing so, I was able to ensure themes stayed as close to participants' words as possible, in order to capture the true essence of their experiences. It is worth acknowledging this was somewhat limited by the absence of opportunity (as there would be in interviews) to explore meanings and intent through reciprocal interaction with participants. Nevertheless, being aware of my own experiences and reflecting upon how these form my own interpretive framework has been an invaluable skill I have used throughout my internship, with the support of supervision to facilitate this.

Similarly, in my internship, parents of clients have expressed doubt in my ability to provide family-based interventions and parenting strategies having not been a parent myself. I had certainly anticipated this before starting my internship, as I was acutely aware of my own inexperience. I initially noticed the urge to overcompensate by justifying my knowledge or excessively reassuring families. However, I used supervision and self-reflection to reflect on the intention behind this and consider how useful this would be. This helped me to find a balanced approach to acknowledging parental doubt whilst proceeding with confidence in my own ability to utilise my skills to support families. In the first instance, this has involved acknowledging parents as experts of their own child and positioning myself alongside parents with empathy, honesty, and validation with the belief that they are doing the best they can with the skills they have. This has enhanced rapport and trust which has been an essential prerequisite to embarking on parent skills training. In my observations, I have found parents willingness to reflect and make adjustments to their parenting practices expand as the therapeutic relationship strengthens. Thus, both in my research and clinical training, I have learned a lot about doubt stemming from difference and the importance of managing this through supervision, self-reflection, and acceptance.

Shame and the power of connection

Shame was inadvertently conveyed by multiple participants when describing their journeys with weight and shape pre and post-surgery. This was suggested in various messages that reflected self-blame, a perceived need to manage alone, and embarrassment about one’s struggles with weight and food. Thus, shame appeared to increase suffering and prevent help-seeking behaviour, underpinned by an implied belief that support was only justified once a position of helplessness and desperation was reached.

Most participants endured years of isolated suffering having made several attempts to manage alone through unsuccessful diets and exercise methods. Ultimately, this appeared to diminish self-efficacy and perpetuate shame through perceived failure, both of which led to further withdrawal and isolation. However, surgery was only pursued once personal health had become a “life or death situation.” By this point, most felt disheartened, disempowered, and helpless, all of which exacerbated fear of weight-gain post-surgery with most perceiving themselves as incapable of effectively managing this.

As such, the FOHL Retreat was identified by participants as largely beneficial in interrupting these shame-driven thoughts and feelings. They described how connecting with others through shared experiences of weight-loss surgery inadvertently challenged helplessness by reigniting motivation to pursue health-based living and encouraging help-seeking behaviour. Hearing others share similar difficulties appeared to normalise one's own and facilitate a transition from self-blame to self-compassion. This exemplified potential ways in which connection and shared experience can function as an antidote to the negative impacts of longstanding shame.

Understanding shame and its impact has been largely relevant to my work in CAMHS. I have seen high levels of mental health-related shame within the adolescent population I work with. Both public and self-stigmatising beliefs about mental health continue to be barriers to help-seeking behaviour among young people. Many clients fear negative judgement about their mental health from adults and peers, often identifying this as the main reason for managing alone and avoiding asking for help. Clients have reflected on the pain they experience from being labelled 'attention seekers' by coming to therapy. I have heard adolescents perceive themselves as underserving of support which has been reinforced by perceived peer pressure to justify their difficulties are 'bad enough' to warrant professional help. As a result, young people's mental health difficulties have often gone unnoticed for long periods before they present to Kari Centre. This has had significant and negative effects for those struggling, including increased symptom severity, hopelessness, and risk.

I have also observed the ability for connection to reduce shame within young people, particularly through my observations as a facilitator of group therapy. I will use the following case example to illustrate this. Following my assessment of a client presenting with disordered eating and anxiety, I initially began individual therapy informed by my preliminary formulation and evidence-based eating disorder treatment guidelines. However, little progress was made in individual sessions and I became increasingly aware of the importance the client placed on keeping her difficulties 'private.' As such, she felt unsupported by those closest to her and often complained of feeling alone and isolated. I decided to explore this further with the client, specifically, the fears that underpinned her perceived need for privacy. From this discussion, I was able to identify high levels of shame within the client and reflect how this maintained isolation. I also hypothesised how this may have limited the usefulness of therapy so far, as hiding internal experiences in sessions meant important therapeutic material continued to be missed and avoided.

Based on the knowledge I had about the impact of group therapy on challenging shame-based beliefs for my research participants, I decided to suggest this client transition to group therapy, to which they agreed with some apprehension. During the first three group sessions, I was struck by the interactions I observed between the client and other group members. Though her verbal self-disclosures were minimal, she listened attentively to others and offered thoughtful supportive advice. The client demonstrated an increased willingness to be vulnerable in small group discussion and rated her satisfaction in the group highly. At the final session, she shared her takeaway learnings with the group which included "I don't have to struggle alone" and "it's okay to not be okay." Hearing this feedback was a really valuable moment for me as a developing clinician. It reinforced the importance of addressing factors such as shame in therapy and highlighted how enhancing connection with others is one way of doing so.

In summary

I believe that my doctoral research experience has allowed me to develop several skills and insights that have been valuable to my work as an intern psychologist. My engagement with ACT research and literature in the context of eating disorders has given me greater insight into the role of experiential avoidance in maintaining psychological suffering in my work with adolescents with eating disorders. I have been able to include this in case formulations and subsequently target emotional acceptance in therapy with ACT-based skills. Completing research with participants whose experiences differ greatly to my own helped prepare me to work with clients whānau, particularly parents. The process of critical reflection and supervision I undertook when analysing research participants' experiences was carried through into my internship and continues to inform the way I work with whānau. Lastly, shame, connection, and their relationship were pertinent themes in both my research and clinical practice. Thus, despite viewing the experiences of completing my doctoral research and internship as vastly different, it is clear the lessons I have learned during both have served to benefit each other, and I will continue to take these learnings into my future practice as a clinician.

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