A Contextual Behavioral Approach for Obesity Surgery Patients

SANDRA WEINELAND
Abstract

This thesis investigates a contextual behavioral approach for obesity surgery patients. In a contextual approach a behavior is interpreted as inseparable from its current and historical context. Candidates for bariatric surgery often have a history of self-stigma, body dissatisfaction and eating for emotional relief. Despite losing a large amount of weight post surgery, psychological problems may still be present for some patients. One possible common underlying process observed in body concerns and eating patterns is experiential avoidance. Experiential avoidance is defined as; any attempt to avoid, change, or control unwanted thoughts and feelings when so doing causes harm.

Though a multidisciplinary team is recommended for post-surgical care, there are few studies evaluating the psychological treatment of patients undergoing bariatric surgery. In this thesis a protocol based on Acceptance and Commitment Therapy (ACT), was developed and implemented, partly via the Internet, in a clinical setting. In an acceptance-based approach to obesity, psychological well-being is the main outcome. ACT was significantly more effective than ‘treatment as usual’ in terms of body dissatisfaction and quality of life after surgery. Both groups improved in eating disordered attitudes and behaviors. Predictions based on the underlying treatment model were also investigated. Positive treatment outcomes were found to be associated with increased psychological flexibility. Despite some methodological limitations, the results are promising and future studies should further evaluate ACT in the context of bariatric surgery.

This thesis also acknowledges the need for clinical assessment tools appropriate for the bariatric surgery context. The Acceptance and Action Questionnaire for Weight (AAQ-W) is a measure of experiential avoidance, and was evaluated in the present thesis. The AAQ-W was found to be a reliable and valid measure for people undergoing bariatric surgery. Another measure, Disordered Eating in Bariatric Surgery (DEBS) was developed and evaluated. The DEBS was found to posses satisfactory psychometric properties in terms of reliability and validity. The AAQ-W and the DEBS may facilitate both systematic clinical evaluation and future research within the area of bariatric surgery.

Keywords: obesity, bariatric surgery, stigma, emotional eating, body dissatisfaction, Acceptance and Commitment therapy, Internet

Sandra Weineland, Uppsala University, Department of Psychology, Box 1225, SE-751 42 Uppsala, Sweden.

© Sandra Weineland 2012

ISSN 1652-9030
urn:nbn:se:uu:diva-183622 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-183622)
We can always return to love and equanimity
Reference picture on the cover:


The sculpture is an alternative self-portrait by a Swedish artist. It shows the two sides of the same coin, having bulimia and anorexia. The work is also a reaction to our cultures body fixation and reminds us to be proud of ourselves, and that all people have equal value.
List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.


Reprints were made with permission from the respective publishers.
# Contents

Introduction .................................................................................................................. 11
Medical Definition of Obesity ................................................................................... 11
Obesity Epidemic ......................................................................................................... 12
Living With the Stigma of Obesity ............................................................................ 13
Body Dissatisfaction: A form of Weight-related Self-stigma ................................ 13
Behavioral Patterns of Eating for Emotional Relief ............................................. 14
Learning theory........................................................................................................... 14
A History of Yo-Yo Dieting ....................................................................................... 15
Mechanisms Explaining Weight Regain After Dieting ........................................... 16
Behavioral Weight Loss Treatments ........................................................................ 17
Weight Regain after Behavioral Interventions ......................................................... 18
  Psychological Predictors of Weight Loss after Behavioral Interventions .......... 19
  Variations in Behavior Therapy .............................................................................. 20
An Acceptance-based Conceptualization of Obesity .............................................. 21
Acceptance and Commitment therapy (ACT) ......................................................... 23
  Relational Frame Theory (RFT) ............................................................................ 23
  ACT in the Clinical Practice ................................................................................... 24
  Empirical Status of ACT ...................................................................................... 27
Acceptance Interventions for Obesity Related Struggles ................................ .... 28
Bariatric surgery: Best Evidenced based Intervention for Long-term Weight Loss .................................................................................................................. 30
  Bariatric Surgery Outcomes ................................................................................. 32
Conditioned Behavioral Patterns ............................................................................. 33
  Relationship to the Body After Bariatric Surgery .............................................. 34
  Individual Behavioral Analyses of Body Dissatisfaction .................................... 36
  Eating Patterns After Bariatric Surgery ............................................................... 36
Behavior Therapy in Combination With Surgery .................................................. 37
ACT and Bariatric Surgery ....................................................................................... 39
Measuring Behavioral Patterns in the Context of Bariatric Surgery .................... 40
Measuring Processes of Change in Psychotherapy ................................................. 41
Cognitive Behavioral Internet Therapy (ICBT) ....................................................... 41
  ICBT for Weight loss ........................................................................................... 42
Assumptions aims and research questions ............................................................. 43
Ethical considerations ............................................................................................. 45
Empirical Studies ......................................................................................................................... 46
Study I: Acceptance and Commitment therapy for Bariatric Surgery patients - a Pilot study .......................................................... 46
  Introduction ............................................................................................................................ 46
  Aim ..................................................................................................................................... 47
  Method ................................................................................................................................. 47
  Measurements ..................................................................................................................... 50
  Statistical analysis ............................................................................................................ 51
  Results .................................................................................................................................. 51
  Discussion ........................................................................................................................... 53
Study II: Psychological Flexibility and the Gains of Acceptance-based treatment post Bariatric Surgery: Six-month follow-up and test of the Underlying Treatment Model ................................................................. 54
  Introduction ........................................................................................................................ 54
  Aim ..................................................................................................................................... 54
  Method ................................................................................................................................. 54
  Measurements ..................................................................................................................... 55
  Statistical analysis ............................................................................................................ 55
  Results .................................................................................................................................. 56
  Discussion ........................................................................................................................... 59
Study III: Measuring experiential avoidance in bariatric surgery patients - psychometric properties of the AAQ-W .......................................................... 60
  Introduction ........................................................................................................................ 60
  Aim ..................................................................................................................................... 60
  Method ................................................................................................................................. 60
  Measurements ..................................................................................................................... 61
  Statistical analysis ............................................................................................................ 61
  Results .................................................................................................................................. 62
  Discussion ........................................................................................................................... 63
Study IV: Screening for Disordered Eating following Obesity Surgery. Psychometric properties of the Disordered Eating in Bariatric Surgery (DEBS) .................................................................................. 64
  Introduction ........................................................................................................................ 64
  Aim ..................................................................................................................................... 64
  Method ................................................................................................................................. 64
  Measurements ..................................................................................................................... 65
  Statistical analyses .......................................................................................................... 65
  Results .................................................................................................................................. 65
  Discussion ........................................................................................................................... 68
General discussion ................................................................................................. 69
Treatment Evaluation ............................................................................................. 69
Effectiveness .......................................................................................................... 69
Mediational Effect .................................................................................................. 72
Treatment Acceptability ......................................................................................... 72
Instruments evaluated in the context of bariatric surgery .................................. 72
Contributions .......................................................................................................... 73
Limitations ................................................................................................................ 74
Future considerations ............................................................................................... 76
Conclusions .............................................................................................................. 77

APPENDIX .................................................................................................................. 78

Acknowledgments ................................................................................................... 83

References ............................................................................................................... 87
## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT</td>
<td>Acceptance and Commitment Therapy</td>
</tr>
<tr>
<td>ANOVA</td>
<td>Analysis of Variance</td>
</tr>
<tr>
<td>AAQ</td>
<td>Acceptance and Action Questionnaire</td>
</tr>
<tr>
<td>AAQ-W</td>
<td>Acceptance and Action Questionnaire for Weight</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>BSQ</td>
<td>Body Shape Questionnaire</td>
</tr>
<tr>
<td>CBT</td>
<td>Cognitive Behaviour Therapy</td>
</tr>
<tr>
<td>DEBS</td>
<td>Disordered Eating in Bariatric Surgery</td>
</tr>
<tr>
<td>EDE-Q</td>
<td>The Eating Disorder Examination Questionnaire</td>
</tr>
<tr>
<td>EOQ</td>
<td>Emotional Overeating Questionnaire</td>
</tr>
<tr>
<td>GBP</td>
<td>Gastric By Pass</td>
</tr>
<tr>
<td>ICBT</td>
<td>Internet-based Cognitive Behaviour Therapy</td>
</tr>
<tr>
<td>ITT</td>
<td>Intent To Treat</td>
</tr>
<tr>
<td>LSG</td>
<td>Sleeve Gastrectomy</td>
</tr>
<tr>
<td>MMRM</td>
<td>Mixed Model Repeated Measures</td>
</tr>
<tr>
<td>PCA</td>
<td>Principal Component Analysis</td>
</tr>
<tr>
<td>RFT</td>
<td>Relational Frame Theory</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized Controlled Trial</td>
</tr>
<tr>
<td>TAU</td>
<td>Treatment As Usual</td>
</tr>
<tr>
<td>WHOQOL-BREF</td>
<td>World Health Organization Quality of Life - BREF</td>
</tr>
</tbody>
</table>
Introduction

Obesity is spreading all over the world. Traditional weight loss treatments have failed and bariatric surgery is the only evidence-based treatment for long lasting weight loss today. Candidates for obesity surgery seem to have a long history of conditioning self-stigma, which for some continue post surgery. Efforts to increase knowledge about psychological post surgery issues as well as designing effective behavioral treatment interventions post surgery seem to be needed. The current thesis investigates an acceptance based treatment intervention following surgery for obesity. In addition two instruments, the Acceptance and Action Questionnaire for weight and Disordered Eating in Bariatric Surgery, are evaluated in the obesity surgery setting.

Medical Definition of Obesity

Obesity was included in the International Classification of Diseases 1948 (Sullivan, 2011). The medical definition of obesity includes physical classification, related health problems and genetic aspects.

Obesity is a condition of accumulated excess body fat linked to health problems. Various methods exist for measuring excess body fat. The World Health Organization (WHO) developed a standardized classification system for body mass index (BMI) for weight status in 1993. BMI is calculated by dividing a person’s weight in kilograms by their squared height in meters ($\text{kg/m}^2$). In adults, overweight is defined as a BMI $> 25$ and obesity as a BMI $> 30$ (World Health Organization, 2000). In the clinical setting, the diagnosis of obesity is assessed using the BMI.

The medical definition of obesity also includes a link to health problems. Obesity is directly or indirectly associated with a wide range of health issues, including type 2 diabetes, high blood pressure, coronary heart disease, certain forms of cancer (breast, colon, uterus), certain diseases of the muscular system (Janssen, Katzmarzyk, & Ross, 2004; Kopelman, 2000; Pi-Sunyer, 1993) and increased all-cause mortality (Berrington de Gonzalez et al., 2010). The major contributor to hypertension and diabetes is intra-abdominal visceral deposition of adipose tissue, which characterizes upper body obesity. Excess fat influences glucose metabolism through additive mechanisms. Body oxygen consumption is increased, which results in increased cardiac output and blood pressure (Kopelman, 2000).
From a medical multimodal perspective, body weight is regulated by an interaction between genetic, environmental, and psychosocial factors working through physiological mediators of energy intake and energy expenditure, such as peripheral hormones (World Health Organization, 2007). Estimates for the contribution of genotype to obesity are 30-70% (Loos & Bouchard, 2003; Sullivan, 2011). Twin studies confirm that a genetic predisposition for obesity can increase the risk of developing obesity, but it is not a necessity for excess body fat to develop (Bouchard et al., 1990). Evidence that can map the appropriate combination of genes and mutations that are associated with obesity is missing (Rankinen et al., 2006). One suggested medical definition of obesity is that it is a heritable condition highly sensitive to environmental conditions (O’Rahilly & Farooqi, 2008). Genetic predisposition cannot alone explain the rapid increase in obesity worldwide (Astrup, Hill, & Rössner, 2004; Kopelman, 2000).

Obesity Epidemic

Obesity has reached epidemic proportions (World Health Organization, 2007). Approximately 396 million adults, or 9.8% of the world’s adult population, are obese, and 1120 million adults are expected to be obese in 2030 (Kelly, Yang, Chen, Reynolds, & He, 2008). In Sweden, 50% of adult men and 30% of adult women are overweight or obese. Roughly 10% of Swedish people meet the criteria for obesity (Statistiska Centralbyrån, 2011).

The obesity epidemic can be explained by the combination of genetic predispositions, behaviors, and “toxic food environment”. The toxic food environment refers to exposure to high-calorie, high-fat, and inexpensive food that is socially promoted (Brownell, & Horgen, 2004). In Western society, lower education and income correlate with higher obesity rates, which is explained by unhealthy food being less expensive (Drewnowski & Darmon, 2005). The toxic food environment also includes factors promoting an inactive lifestyle, such as sitting at work (Brownell, & Horgen, 2004).

It has been proposed that eating for emotional relief may be a contributing factor to the increasing prevalence of obesity (Torres & Nowson, 2007). People commonly use food to regulate emotions when distressed. Approximately 40% of people increase food intake, especially fat and sugar, when experiencing negative emotions (Dallman, 2010). People who are overweight also seem to gain more weight when experiencing stress (Dallman, 2010). Thus, increases in obesity are likely a result of the combination of genetic predispositions, an environment with high exposure to unhealthy foods and eating for emotional relief.
Living With the Stigma of Obesity

Being obese has different meanings in different contexts. In Saharan Africa, obesity is the symbol of success and wealth (Renzaho, 2004), while in most western societies it is associated with characteristics such as being lazy, less competent, lacking self-discipline, and being emotionally unstable (Wang, Brownell, & Wadden, 2004). Obese people are stigmatized and discriminated in a number of areas, including social settings, school, and interactions with health professionals (Myers, 1999; Puhl & Brownell, 2001; Puhl & Heuer, 2009). Physicians, nurses, psychologists, and even health care professionals specializing in the treatment of obesity have reported that they hold negative attitudes regarding obese patients (Davis-Coelho, Waltz, & Davis-Coelho, 2000; Teachman & Brownell, 2001). Obese individuals also receive less pay for the same job and rarely obtain high-level positions relative to average weight individuals (Puhl & Brownell, 2003). Negative attitudes transmitted in public ridicule and teasing have negative effects on several domains in life, including intimate relationships (Puhl & Brownell, 2001; Puhl & Heuer, 2009). Evidence shows that factors such as: degree of excess weight, being female, and early onset of obesity increases the risk for emotional suffering (Fabricatore & Wadden, 2004; Schwartz & Brownell, 2004). Stigmatizing experiences correlate with social isolation, depression, and binge eating (Annis, Cash, & Hrabosky, 2004; Puhl & Brownell, 2001).

Stigma is a multidimensional concept and includes a variety of experiences. Besides being stigmatized by others, people with obesity also tend to stigmatize other persons with obesity. This in-group devaluation includes stereotypes, such as obese people being lazier than thin people (Wang et al., 2004). Negative attitudes are not only held towards other obese people, but also in relation to oneself being obese, which is called self-stigma (Annis et al., 2004; Puhl & Heuer, 2009).

Body Dissatisfaction: A form of Weight-related Self-stigma

Weight-related self-stigma is recognized by self-devaluation and fear of other judgments based on weight (Lillis, Luoma, Levin, & Hayes, 2010). Self-stigma may include thoughts about being undesirable and that ”there is something wrong with me”. Body dissatisfaction has been described as one form of internalized self-stigma among persons with obesity (Wang et al., 2004). Body dissatisfaction is characterized by behaviors such as pre-occupation with weight, self-devaluation, avoidance of body exposure and avoiding for example intimate relationships (Puhl & Heuer, 2009). Body dissatisfaction correlates with both depression and low self-esteem among overweight and obese patients (Hrabosky, Masheb, White, & Grilo, 2007;
One strategy for handling negative emotions is eating for emotional relief (Spoor et al., 2006; Valdo Ricca et al., 2009). Evidence shows that shame and body dissatisfaction correlate significantly with over eating among obese patients (Annis, Cash, & Hrabosky, 2004; Hrabosky et al., 2007; Puhl & Brownell, 2001). In addition, experiences of obesity stigmatization predicts binge eating behaviors (Ashmore, Friedman, Reichmann, & Musante, 2008; Schvey, Puhl, & Brownell, 2011). An interpretation of these results is that binge eating could be one strategy to escape self-stigmatizing thoughts and worries.

Behavioral Patterns of Eating for Emotional Relief

A greater prevalence of anxiety and depression has been found among persons who are overweight or obese than among normal weight persons in community samples (Petry, Barry, Pietrzak, & Wagner, 2008). Eating for emotional relief seems to be an important factor for the onset and maintenance of binge eating (Spoor et al., 2006; Valdo Ricca et al., 2009). Binge eating refers to recurrent episodes of the consumption of large amounts of food in a discrete period of time (2 h) in association with a sense of a loss of control over eating (American Psychiatric Association, 1994). In a prospective study, body dissatisfaction was shown to predict binge eating after five years among overweight individuals (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006).

Among obese patients seeking weight loss treatments, 7-30% suffer from binge eating (Ricca et al., 2000; Spitzer et al., 1993). In a Swedish sample of treatment-seeking obese patients, 17% reported episodes of binge eating and 5% fulfilled the diagnostic criteria for binge eating disorder (de Man Lapidoth, Ghaderi, & Norring, 2006). Obese individuals who experience binge eating report more psychiatric comorbidities, eating disorder psychopathology, subjective distress, and impairments in quality of life than obese persons who do not binge eat (Wonderlich, Gordon, Mitchell, Crosby, & Engel, 2009). Learning theory has a framework for explaining the maintenance of behavioral patterns of binge eating for emotional relief.

Learning theory

According to learning theory, behaviors are shaped through conditioning. Operant conditioning concerns voluntary behavioral responses. From an operant, perspective, the feeling of relief gained from eating enhances the probability of using food when having negative emotions in the future. The theory states that behaviors, in a certain context, result in certain consequences. Consequences may be reinforcing or punishing. Reinforcement
increases the likelihood of a behavior in the future. Negative reinforcement involves something being removed that increases the likelihood of the behavior, for example relief from negative emotions by eating (Dahl, Plumb, Stewart, Lundgren, 2009; Skinner, 1938/1999). Positive reinforcement occurs when something is added, such as an experience or an object, that increases the likelihood of the behavioral response in the future (Dahl, Plumb, Stewart, Lundgren, 2009; Skinner 1938/1999). The second form of consequence is punishment. Punishment decreases the likelihood of a behavior in the future. For example a person going to the gym, but are reprimanded by the instructor for having a bad physical condition, will likely not come back to the gym.

Likely both reinforcement and punishment contribute to the retention of behavioral patterns among persons with obesity. Researchers have observed significant associations between stigmatizing experiences, body dissatisfaction, and overeating among treatment-seeking individuals with obesity (Neumark-Sztainer et al., 2006; Puhl & Heuer, 2009). Beside overeating, dieting is another common behavioral pattern among obese treatment-seeking patients (Gibbons et al., 2006).

A History of Yo-Yo Dieting

Dieting refers to intentional efforts to achieve or maintain a desired body weight through reduced caloric intake (Stice, Akutagawa, Gaggar, & Agras, 2000). People with higher BMI tend to engage more in both unhealthy (e.g., skipping meals) and healthy dieting (e.g., eating vegetables) than normal weight persons (Gillen, Markey, & Markey, 2012). Reviews examining the success of dieting conclude that diets lead to short-term weight loss, usually 5-10% of body weight, but this weight loss is not maintained over the long-term for the majority of people (Garner & Wooley, 1991; Jeffery et al., 2000; Mann et al., 2007; Perri, 1998). In a review of a range of diet programs, it was found that, an average weight loss of 4% is maintained after 4 years (National Institutes of Health, 1998). A treatment-seeking person with obesity often has several cycles of weight loss and weight gain in his/her history (Gibbons et al., 2006). Yo-yo dieting refers to the process of weight cycling up and down, where there is an initial success with weight loss followed by weight gain (Brownell, Greenwood, Stellar, & Shrager, 1986).

Some research indicates that restrictive dieting increases the risk of negative emotions and body dissatisfaction (Roehrig, Thompson, & Cafri, 2008; Stice & Shaw, 2002). Rigid patterns of controlling body weight may reduce anxiety for the moment. A hypothesis is that a feeling of relief is elicited when engaging in behaviors aiming at changing the body from "undesirable" to "desirable". However in the long run, the body becomes conditioned to aversion in the context of rigid control, making the person vulnerable for low
self-esteem and depression. Studies show that negative concerns with eating, weight, and body shape is common among treatment-seeking individuals with obesity (Hrabosky et al., 2007; Hrabosky et al., 2008; Sarwer et al., 2010). In addition yo-yo dieting is associated with the conditioning of self-aversive judgments, including shame and guilt (Annis et al., 2004).

People persist in rigid dieting even though success is short-term and associated with negative emotions in the long run. According to learning theory, responses that are not reinforced should be extinguished. However, diets do not fail at first, initial success occurs and probably provides immediate reinforcement for the new weight loss attempt. This process is called the ‘false hope’ syndrome in the field of obesity (Polivy & Herman, 1999). Both medical and psychological explanations for why any diet only works in the short term have been proposed.

Mechanisms Explaining Weight Regain After Dieting

Little is known about the mechanisms responsible for weight regain following dieting, but several explanations have been proposed. One medical hypothesis is that the genetic predisposition overrides dieting attempts among persons with obesity (Loos & Bouchard, 2003; Rankinen et al., 2006). Another medical explanation is that diets induce decline in energy expenditure, reduction in leptin (satiety hormone), and increase in ghrelin (hunger hormone) (Dokken & Tsao, 2007). In addition, decreased body weight is associated with changes in skeletal muscle fuel expenditure (Goldsmith et al., 2010). From an evolutionary perspective, the physical homeostatic resistance to a weight-reduced state is probably a protection against the effects of starvation (Dokken & Tsao, 2007). This process may partially explain the difficulties maintaining a lower weight after dieting. Interestingly, one study showed that twins who dieted were significantly heavier than their sibling twins who had no history of weight loss attempts (Pietilainen, Saarni, Kaprio, & Rissanen, 2012).

One proposed psychological explanation for weight regain is the food restriction theory first studied in an experimental starvation study (Keys, Brozek, Henschel, Mickelsen, & Taylor, 1950). The study showed that severe food restriction is frequently followed by overeating and binge eating (Keys et al., 1950). Restrained eating refers to chronic efforts to limit food intake with the purpose of changing the body. Restrained patterns of eating include complete avoidance of certain foods, such as sweets. The rigid limitations in food intake are hypothesized to make the dieter vulnerable to binge eating. These patterns of eating are characterized by an “all-or-nothing” approach. Little is known about the development and onset of binge eating disorder among obese patients. However, the temporal relationship between dieting and binge eating has been examined in one study. The majority of obese pa-
tients reported becoming overweight before they started dieting and then binge eat (Reas & Grilo, 2007). The sequence of first dieting and then binge eating spanned over a decade and propose that paradoxically dieting may increase the risk for future overeating and gaining weight (Reas & Grilo, 2007).

Beside the restriction theory, two other behavioral patterns have been proposed for explaining weight gain during dieting: reaction on negative emotions and food craving. Emotionally upsetting experiences can disturb the person’s vigilance for following a diet. In addition negative emotions may trigger eating for emotional relief (Stice et al., 2000). Food craving is hypothesized to be evoked by a monotonous diet (a diet with a limited number of foods). Some evidence shows that food cravings mediate the association between rigid dieting and weight gain (Meule, Westenhöfer, & Kubler, 2011).

Studies have proposed that there is a difference between restrictive dieting and flexible dieting (Johnson, Pratt, & Wardle, 2011; Teixeira, Going, Sardinha, & Lohman, 2005; Westenhoefer, von Falck, Stellfeldt, & Fintelmann, 2003). Flexible dieting is characterized by eating a variety of foods in moderation. The approach is that eating patterns are long-termed or permanent (instead of a “quick-fix” diet). The goal is a slow and graduated weight loss. Individuals with obesity using flexible control seem to be more successful at long-term weight maintenance than those using rigid control (Teixeira et al., 2005; Westenhoefer et al., 2003). In line with this a recent review on dieting concludes that healthy self-regulation of food is associated with control over weight in the longer term (Johnson, Pratt, & Wardle, 2012). In professional health care, long-term healthy changes and the maintenance of weight loss is more often the focus than the rigid dieting and strict caloric control promoted by commercial weight loss programs (Shaw, O’Rourke, Mar, & Kenardy, 2005).

Behavioral Weight Loss Treatments

Traditional behavioral weight loss treatments include strategies drawn from nutrition and physical science as well as behavior therapy. Behavioral interventions share the main objective of modifying behavior and lifestyle (Shaw, et al., 2005).

Behavior therapy for obesity was first developed and evaluated over 40 years ago. While behavioral researchers acknowledge that body weight is affected by genetic predisposition, metabolic factors, and hormonal functions, the underlying assumption is that behaviors related to eating and physical activity are learned and can therefore be modified (Foster, Makris, & Bailer, 2005). Behavior therapy programs for obesity are goal directed, structured, and provide the participant with strategies for overcoming barriers to healthy behavior change (Foster, Makris, & Bailer, 2005).
Behavior therapy is associated with better weight maintenance than other psychological treatments for obesity (Shaw et al., 2005). Weight loss programs combining all three components of dieting, physical activity and behavioral therapy strategies provide greater weight loss compared to weight loss programs without behavior therapy (National Institutes of Health, 1998; Shaw, et al., 2005). Different strategies are available for behavioral changes in the context of obesity (National Institutes of Health, 1998; Shaw, et al., 2005). Below is a list of commonly used strategies:

- **Self-monitoring** typically includes recording the amount of food, type of food, amount of physical activity, and cognitions and emotions associated with these behaviors. The record is thought to increase insight into the person’s behavioral patterns.

- **Stimulus control** strategies aim at identifying stimuli and high-risk situations that encourage accidental eating. Stimulus control may include keeping high-calorie food away from the house.

- **Problem solving and pre-planning** are strategies used for self-correction and the implementation of healthier behaviors. This approach may include strategies such as a grocery list containing low-calorie and low-fat products.

- **Relaxation** techniques are used for handling stress that may otherwise trigger over eating.

- **Rewards** are used to enhance healthy behaviors. Strategies of rewards may be used by the patient or by the therapist when the patient performs healthy behaviors.

- **Strategies of cognitive restructuring** commonly involves the correction of unrealistic goals of weight loss.

One of the most recognized behavioral treatment manuals for obesity is the LEARN program (Brownell, 2004). The manual incorporates many different behavioral and cognitive strategies. The guidelines from the U.S. Department of Health and Human Services recommend behavioral weight loss programs that include many different behavioral strategies (National Institutes of Health, 1998) and long treatment durations. The most common length of a behavioral program is 16-26 weeks of weekly sessions (Shaw et al., 2005; Wadden & Stunkard, 2002).

**Weight Regain after Behavioral Interventions**

When evaluating predictors of weight control, successful weight maintenance is most often defined as losing at least 10% of one’s body weight and maintaining the loss for at least one year (Wing & Phelan, 2005). A loss of 8-10% of initial weight is achieved in comprehensive programs combining a
low calorie diet, physical activity, and cognitive behavioral therapy (CBT) interventions (Shaw et al., 2005). Loss of these sizes improves the medical health indices of participants (Jones, Wilson, & Wadden, 2007). Unfortunately, initial success is followed by weight regain for the majority of individuals (Anderson, Konz, Frederich, & Wood, 2001; NIH & Public Health Service National Institutes of Health National Heart, September 1998; Safer, 1991; Wadden, Butryn, & Byrne, 2004; Yanovski & Yanovski, 2002). Five years after completing a behavior therapy program, 50% of participants return to their baseline weight or more (Jones et al., 2007). The average individual maintains a weight loss of less than 1.8 - 3 kg five years after participating in the program (Anderson et al., 2001; Turk et al., 2009). Research has evaluated the psychological predictors of weight loss with the aim of developing effective behavioral programs and matching participants to different interventions.

Psychological Predictors of Weight Loss after Behavioral Interventions

The research field concerning psychological predictors of weight loss, suffers from a range of methodological shortcomings and comparing results is difficult because populations, interventions, and measures differ between trials (Elfhag & Rössner, 2010). However, it seems, as most participants in behavioral interventions do not maintain the behavioral changes entailed in the new dietary or exercise routines. A high rate of relapse to old habits, including decreases in energy expenditure, dietary disinhibition, and overeating, is associated with weight gain (Elfhag & Rössner, 2005; Jeffery et al., 2000; McGuire, Wing, Klem, Lang, & Hill, 1999). In a review of available studies evaluating psychological predictors, Teixeira et al. (2005) conclude that only a few pre-treatment predictors of success are valid at 1-year follow-up. The identified predictors with consistent evidence are fewer previous weight loss attempts, higher internal motivation, and general self-efficacy. In another review of psychological predictors, Elfhag & Rössner (2005) define successful weight maintenance as maintaining the initial weight loss for at least 6 months. In a review the authors identified a number of predictors of success, such as having a physically active lifestyle, a regular meal rhythm, self-monitoring of behaviors, internal motivation, and the ability to handle stress in life. Elfhag & Rösner (2005) also found that emotional eating and an attitude of avoidance when confronted with problems in life predicted weight gain at 6 months follow-up. However, Texierea et al. (2005) did not find evidence that binge eating and emotional eating are predictive of weight regain at the 1-year follow-up.

Studies evaluating multiple predictors in a single obesity population are also lacking. However, this comparison was performed in a comprehensive
evaluation of multiple predictors in a Swedish population. The strongest association with success was initial weight loss in the early treatment phase of a one-year group treatment (Elfhag & Rössner, 2010). The authors’ interpretation was that initial weight loss may have been the result of behavioral changes and an indication of the participants’ beliefs in change early in the treatment. Beliefs in change may be difficult to capture with self-reported questionnaires and may be better assessed with weight loss numbers.

Keeping participants during the whole treatment period is also important for success with weight loss (Elfhag & Rössner, 2010). The dropout rate in obesity trials has been reported to be 30-50% (Dalle Grave et al., 2005; Elfhag & Rössner, 2010; Elobeid et al., 2009). Higher expectations on weight loss have been shown to be associated with a higher risk of dropping out at 12 months (Dalle Grave et al., 2005). In the search for more successful treatments, different variations of behavior therapy have been evaluated (Turk et al., 2009). Variations include prolonging treatment or focusing on the psychological aspects underlying unhealthy behaviors.

Variations in Behavior Therapy

Some researchers have evaluated the effect of prolonging the treatment period on weight loss maintenance. In one study, an intense diet program included follow-up meetings during a 7-year period. Although medications for obesity related comorbidities were discontinued among 66% of the participants, only about 25% of the patients maintained a weight loss of at least 10% nine years after starting the treatment (Anderson, Conley, & Nicholas, 2007). In another study, a lifestyle modification program combined with a low-calorie diet and prolonged follow-up resulted in losses of 10% of the initial weight among 35% of participants after 5 years (Wadden & Frey, 1997). Although Wadden and Frey (1997) speculate that losses of 5% or more of initial weight could be associated with improvements in health complications, they question if this offset the cost prolonging treatment. Other trials have focused more on the psychological aspects underlying obesity problems.

Cooper & Fairburn (2001) proposed that rigid dichotomous attitudes and unrealistic weight loss goals are the problem with weight maintenance following behavior therapy. Participants are disappointed with the achieved weight loss of 5-10%, which induces abandonment of weight loss strategies and the patients turning back to previous eating patterns (Cooper & Fairburn, 2001). In line with this assumption, Cooper & Fairburn (2001) developed a CBT intervention targeting these cognitive processes. The goal with the CBT intervention is to help participants accept the weight loss achieved and encourage weight stability instead of more weight loss. However, the results are disappointing. Three years after treatment, the additional CBT intervention designed for weight maintenance was no better than regular behavioral
therapy for obesity. In both groups, a majority of participants regained weight (Cooper et al., 2010). Other clinical researchers have focused on reducing binge eating, which is thought to have an effect on the ability to lose and maintain the weight loss. CBT seems to reduce episodes of binge eating, but weight loss is usually not achieved (Wadden, Brownell, & Foster, 2002).

Some researchers have concluded that obesity is resistant to psychological treatment aiming for long term weight loss and the goal with behavioral treatment should be to lessen the negative impact of stigma, body dissatisfaction, emotional eating, and enhancing quality of life (Cooper et al., 2010; Garner & Wooley, 1991). In this approach to obesity, psychological well-being is the main outcome and weight loss more of a secondary outcome (Lillis, Hayes, Bunting, & Masuda, 2009). Interventions that are focused on dissolving underlying behavioral patterns may promote healthy behaviors. For example, dissolving self-stigma about weight may have a positive effect on weight when the participant starts to fill life with valued and meaningful physical activities (Lillis et al., 2009). Acceptance and Commitment Therapy (ACT) for obesity directly targets the underlying factors seen in patterns of disordered eating and body pre-occupation: the unwillingness to have negative feelings or thoughts that lead to inflexible and unhealthy behaviors (Hayes, Strosahl, & Wilson, 2011). The goal with ACT therapy is to enhance psychological flexibility when confronted with difficult experiences related to the body and eating. ACT as a treatment method will be focused on in greater depth, later on in this summary. Next, how obesity related problems are conceptualized in an acceptance-based approach will be described.

An Acceptance-based Conceptualization of Obesity

The goal of behavior conceptualization is the prediction and control of behavior (Hayes, Strosahl, & Wilson, 2011). Specifically, a conceptualization is used to guide the development of treatment interventions.

Some of the behavior patterns associated with unsuccessful weight loss, such as rigid dichotomous attitudes (Byrne, Cooper, & Fairburn, 2003), emotional eating (Byrne et al., 2003; Elfhag & Rössner, 2005; Teixeira et al., 2010), and avoidance behaviors (Elfhag & Rössner, 2005; Teixeira, et al., 2010) may be conceptualized as experiential avoidance. Experiential avoidance, in ACT, is defined as when an individual avoids unpleasant internal experiences, thoughts, and feelings even in those cases where it causes harm (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Beyond obesity, a growing body of evidence suggests that experiential avoidance is central in the development of a broad range of mental and physical health problems (Hayes et al., 2006; Ruiz, 2010). In an acceptance-based conceptualization of obesity, experiential avoidance is seen as a maintaining factor for problematic behaviors (Lillis, Levin, & Hayes, 2011).
Experiential avoidance is predictive of binge eating (Kingston, Clarke, & Remington, 2010). In a prospective study, avoidance used as a coping strategy early in life was shown to increase the risk for the later development of binge eating (Ghaderi, 2003). Also experiential avoidance seems to mediate the relation between negative emotions and binge eating (Kingston, et al., 2010).

There seem to be a paradoxical effect of experiential avoidance, since avoidance seems to increase the strength of thoughts and emotions that are avoided (Barnes & Tantleff-Dunn, 2010; Geliebter & Aversa, 2003; Soetens & Braet, 2006). It has been shown that trying not to think about food has a rebound effect and actually increases food-related thinking (Soetens & Braet, 2006). The suppression of thoughts related to food predicts food cravings, binge eating, and other eating disordered symptoms, such as concern with body shape (Barnes & Tantleff-Dunn, 2010; Geliebter & Aversa, 2003). Rebound of emotional suppression might be one reason that binge eating leads to even more negative experiences, creating cycles of negative feelings, avoidance, and overeating (Hilbert & Tuschen-Caffier, 2007). Therefore, in the case of obesity, binge eating seems to be an example of a behavior pattern that falls under the functional category of experiential avoidance. Other behavioral patterns of experiential avoidance may include avoiding self-stigmatizing thoughts of body dissatisfaction by trying to control or otherwise change the body.

Avoidance of exposure to one’s body and body checking seems to be common among treatment-seeking obese patients (Latner, 2008). The fear of negative evaluations by others is avoided by decreased physical, social, and sexual activities (Kolotkin, Meter, & Williams, 2001). Patients may camouflage the body with special clothing (Sarwer, Wadden, & Foster, 1998) or avoid mirrors or intimacy with their partner (Kolotkin, Crosby, Kosloski, & Williams, 2001). The tendency to avoid experiences is produced, to a large extent, by inner rules (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). For example, an obese patient may equate being thin with being likable. According to an acceptance-based conceptualization, rigidly adhering to this verbal formulation may lead to a preoccupation with weight and avoiding intimacy in relationships. When body image becomes disproportionately important in life, it may be associated with behaviors that interfere with quality of life. A rebound effect may occur and avoidance behaviors maintain dissatisfaction and dysfunctional attitudes about the body (Shafran, Fairburn, Robinson, & Lask, 2004; Williamson, White, York-Crowe, & Stewart, 2004).

One way to deal with experiential avoidance is to increase psychological flexibility around thoughts and feelings, which may lead to more flexible and healthy behaviors. Psychological flexibility is defined as the ability to be aware in the present moment and, based on what the situation affords, changing or persisting behavior to pursue personal goals, even in the presence of interfering thoughts, emotions, or bodily sensations (Hayes et al.,
The overall goal of ACT is to increase psychological flexibility. Next ACT will be discussed as a general treatment method.

**Acceptance and Commitment therapy (ACT)**

ACT is a psychotherapeutic method based on functional contextualism. In functional contextualism a psychological event is seen as an ongoing act of the whole person interacting with the present and historical context. Functional refers to the assumption that behaviors have a purpose, meaning or function, dependent on the context. ACT interventions seek to change behavior patterns by changing the function of behaviors in the context (Hayes, Strosahl & Wilson, 1999).

An underlying assumption in ACT is that avoiding inner private experiences, such as thoughts, emotions, and bodily sensations, interferes with living a meaningful and healthy life. The ACT model states that psychopathology emerges from psychological inflexibility, which consist of six interrelated processes: experiential avoidance, cognitive entanglement, attachment of a conceptualized self, loss of contact with the present moment and the failure to act in accordance with values. Interventions seek to break cycles of avoidance by teaching the patient how to be in contact with inner experiences, and simultaneously taking steps towards a meaningful life (Hayes et al., 2011).

Basic research on cognitions has been conducted to explain processes in ACT. A relatively new contextual theory of cognitions, called relational frame theory (RFT), has been proposed (Hayes et al., 2001).

**Relational Frame Theory (RFT)**

Cognition, or the mental process of thoughts, in RFT, is defined as verbal behavior and operate under the same principles as other behaviors. Verbal behavior is an operant behavior, since it is developed through a history of contingent reinforcement (Hayes, Barnes-Holmes, & Roche, 2001).

We learn to frame events relationally, as we relate stimuli, objects, and words in various ways. For example relations can be "equally", "same", "opposite", "before" or "after". Such as the word “chair” being the same as the object chair. A word, such as “fat”, can be related to the same as threat, danger, disaster, or pain. We act to stimuli from the relation. Such as acting with avoidance on the relation fat – pain. In this way relational responding is a behavior with specified consequences (Törneke, 2010).

Learned relations are based on contextual cues that signal the type of relationship, function, and appropriate response. This process of relating and acting based on contextual cues makes verbal behavior a type of arbitrary relational responding. It is arbitrary since responding is under the control of
arbitrary contextual cues. For example, the words "you're a big girl" in one context, when taking care of younger siblings, can be related to the sense of "being good". In another context, at a school nurse office, "you are a big girl" may be framed as "you are overweight and do not fit in". People often respond to arbitrary cues and relations as truths, even though they are arbitrary. For example a "number on the scale" may be in relation to "thin" and "fat", which is in relation to "success" and "lazy", which in turn is acted upon as truths by overt behaviors such as rigid dieting and staying at home. The ability of relating is unlimited and allows people to compare, evaluate, and judge all objects, including the own feelings and thoughts (Törneke, 2010).

Verbal behavior contributes to psychopathology, such as when a person acts upon a relational frame that is specifying short term relief. Suffering also arises from contacting non-current events and experiencing aversion in the moment (Hayes et al., 2001). For example eating ones heart out about the past or ruminating about the future. In addition contextual cues are everywhere, both inside and outside of the body. For example, body dissatisfaction might be cued by pictures in news magazines, a depressed mood, comments from someone, a wish to go and dance, or even "not thinking of body dissatisfaction". Thus the sources of human suffering are myriad and lie in the relational nature of thinking and the response to these thoughts (Hayes et al., 2006). Unfortunately, learned relationships in networks seem to rarely disappear (Hayes, 2004). However, an alternative to trying to get rid of the inner experiences is to alter their functions. New relational frames of acceptance in regard to stimuli, can be learned, which may also influence more flexible and healthy behaviors (Hayes, 2004).

ACT in the Clinical Practice

In ACT there are two perspectives being presented to the client; self as context which is the observer and self as content which represents psychological content, such as thoughts and feelings. The self as context is a perspective used in ACT to help the client to relate to content, thoughts, feelings, physical sensations in a flexible manner so as to be able to move forward and approach a vital meaningful life (McHugh, Stewart, Williams, 2012).

In ACT behavior change may be achieved by changing perspective on psychological content, (from avoidance/rigidity to acceptance/flexibility). Learning to shift in perspectives is central to ACT. Therefore, ACT interventions include experiential exercises, such as metaphors (Hayes et al., 2011). For example, one commonly used metaphor is "struggling in quicksand". The point is that struggling with content, private events, is similar to struggling in quicksand, the more you struggle the deeper you sink. The only way out of the quicksand is to relax and get with the sand (Stewart & Barnes-Holmes, 2001). The metaphor is helpful for two reasons. Participants learn
to discriminate between struggling/avoiding and floating/accepting. Thus, a new relationship to inner experiences may be learned, which may promote more flexible and healthy behaviors. As such, experiential interventions aim at helping the individual detangle himself or herself from ineffective inner language and promote flexible responses.

An ACT intervention usually includes six basic processes all aimed at achieving psychological flexibility. These six processes are acceptance, defusion, contacting the present moment, self-as-context, value clarification, and behavioral commitment (Hayes et al., 2006). A careful behavior analysis is always used to guide the therapist when and how to use these processes.

Acceptance or willingness is an alternative to avoiding internal experiences when avoiding them causes harm. Acceptance is a form of exposure that involves exposure to feared stimuli or objects in a context without any danger. Acceptance strategies help clients to feel their uncomfortable private experiences in a more open and flexible way without trying to change or control private experiences. This approach is not a passive coping strategy, but an active choice of non-judgmentally seeing thoughts as thoughts, emotions as emotions, and so on. Studies confirm that the effects of exposure seem to work through tolerance (or willingness) to have the emotion rather than reducing emotion (Craske et al., 2008). Through acceptance interventions, participants learn to be aware of sensations, desires, and cravings instead of automatically reacting to them. This type of exposure, or acceptance of one’s feelings, thoughts, and memories adds new stimulus functions to conditioned behavior patterns and allows room for new healthy behavior repertoires. The aim of acceptance is to enhance behavioral flexibility when confronted with experiences that have previously narrowed behavior (Hayes et al., 2011).

Defusion is a concept defined in a way of deliteralizing psychological verbal content that manifests itself as thoughts. ACT attempts to create a functional approach to thoughts, where thoughts may be seen as simply products of the mind and observed without reacting to them in a way which is unhelpful. Defusion helps the client to relate differently rather than attempt to replace thoughts with other thoughts or struggling with them (Hayes, Barnes-Holmes, & Roche, 2001). In ACT thoughts, emotions, and memories are observed as passing events rather than literal truths. An example of a defusion exercise is the “milk, milk, milk” exercise. In this exercise the word milk is repeated, and the participant experiences that the word loses all meaning and becomes only sounds. Milk can be replaced with words such as “bad”, “dumb”, or “fat”. The point is that thoughts are not as true as we think they are. When the grip of the thought loosens, a broader behavioral repertoire may be used (Hayes et al., 2011).
Present Moment Focus is a flexible and voluntary awareness of the inner and outer reality as it is. The purpose of mindfulness interventions is to increase the ability to be consciously present in the moment without evaluating or judging. This focus is a form of awareness characterized by curiosity, openness, and acceptance. This kind of awareness gives participants the opportunity to choose effective behaviors from moment to moment in different situations. The strategy is most often learned in a step-wise fashion. Training starts with directing attention to one's breath, and then to the whole body, thoughts, feelings, and outer world. Therefore, present moment focus is seen as an active behavioral action (Fletcher, Schoendorff, & Hayes, 2010).

Self as context is an observation-based and perspective-taking sense of self. Participants are encouraged to contact a point of consciousness independent of emotional experiences or situations, becoming less entangled with self-criticism and self-narratives. Thoughts, emotions, and bodily sensations are seen as mere passing events, rather than aspects that define the self. One example of an experiential exercise is the chess metaphor. The client imagines that the pieces are his/her own psychological content. Thoughts, emotions, physical experiences and memories are clustered in teams of ”good ones”, the white pieces and the ”bad ones”, the black pieces. The metaphor includes a battle against the white and black pieces. The therapist and the clients plays with the pieces and chessboard for a while using different examples from life. The therapist points out that problem is that the more the person spends time fighting the more important it gets and the battle never stops. The alternative is a change in perspectives from content to self as context. The point is that the person is neither the black nor white pieces; instead, the person is the board that the pieces are standing on. The pieces are the self as content and the board is the self as context. The participant develops a sense of transcendent self, of being the one who is here and now (Louise, Ian, & Mark, 2012).

Values are verbally constructed concepts of what is meaningful and important in different life domains, such as intimate relationships, work, and leisure time. Values clarification can assist in making reinforcers more salient in the environment, which can then guide the individual to make more healthy choices. Values are the context for interventions used in ACT (Dahl, Lundgren, Plumb, & Stewart, 2009).

Commitment is an ongoing behavioral process of valuing and recommitting to behaviors in a chosen valued direction. The participant is encouraged to declare a commitment to and take steps towards a healthy life. The steps involve behavioral actions, even when confronted with barriers, such as negative thoughts and emotions. In ACT every action is analyzed with the function in mind. For example, the therapist may ask the participant, “What is
this behavior ‘in service of’? Is the behavior in the service of avoiding or in the service of approaching values?”. In this way ACT includes both strategies of acceptance and behavioral commitment to behavioral change (Hayes et al., 2006).

These six core processes all aim at increasing psychological flexibility, reducing experiential avoidance, and enhancing quality of life. One way to test if the theory holds is to conduct experiments on each process. In a recent meta-analysis, significant effects were observed for each of the six core processes compared to theoretically different conditions, such as controlling or avoiding inner experiences. In addition, experiential interventions, such as metaphors, were shown to be more effective for ACT than only verbal rationales (Levin, Hildebrandt, Lillis, & Hayes). The effects of ACT interventions are described next.

**Empirical Status of ACT**

Evidence of the effectiveness of ACT has been shown in a number of reviews and meta-analyses (Hayes et al., 2006; Powers, Zum Vöre Sive Vörding, & Emmelkamp, 2009; Pull, 2009; Ruiz, 2010). According to a recent review, ACT was shown to be effective for a wide range of problems, such as addictive behaviors, health psychology, psychotic symptoms, anxiety and depression (Ruiz, 2010). In behavioral medicine, ACT has been shown to be effective for chronic pain (Dahl, Wilson, & Nilsson, 2004; McCracken & Gutiérrez-Martínez, 2011; Thorsell et al., 2011; Wicksell, Olsson, & Hayes, 2010), epilepsy (Lundgren, Dahl, & Hayes, 2008; Lundgren, Dahl, Yardi, & Melin, 2008), diabetes (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), tinnitus (Westin et al., 2011) and weight loss, at least in follow-up within a couple of months or a year (Forman, Butryn, Hoffman, & Herbert, 2009; Lillis et al., 2009; Tapper et al., 2009). ACT is currently listed as evidence-based treatment for chronic pain, depression, mixed anxiety, psychosis and obsessive compulsive disorder (Presidential Task Force on Evidence-Based Practice, 2006/2012). Compared to other psychological treatments, ACT appears to be as effective as CBT (Gaudiano, 2009) and other emotion regulation strategies (Kohl, Rief, & Glombiewski, 2012).

In order to design effective psychological interventions, processes associated with those changes need to be investigated. Mediators refer to processes through which changes are considered to occur (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). The ACT model predicts that positive changes in psychological flexibility during treatment mediate treatment effects. Improved symptoms and behaviors are hypothesized to be associated with increased psychological flexibility. Preliminary evidence using mediation analysis suggests that psychological flexibility is functionally important to the impact of ACT interventions on outcomes for persons with pain...
(McCracken & Gutiérrez-Martínez, 2011; Wicksell et al., 2010), epilepsy (Lundgren, Dahl, & Hayes, 2008), diabetes (Gregg et al., 2007), and obesity (Lillis et al., 2009).

Acceptance Interventions for Obesity Related Struggles

As previously mentioned, CBT, for obesity has traditionally focused on barriers to dietary adherence and physical exercise. Therapeutic strategies include stimulus control, goal setting, and self-monitoring (Shaw et al., 2005). More recent ACT interventions for persons with obesity use a broader context of psychological experiences in the conceptualization of obesity related problems, such as avoiding self-stigmatizing body dissatisfaction by rigid dieting or binge eating (McCracken, 2011). ACT treatments for obesity aim at directly targeting the underlying factor of experiential avoidance involved in inflexible behavioral patterns. Rather than focusing on weight and eating itself, the focus is on observing, in a non-judgmental fashion, inner experiences as separate events and putting energy into commitment to chosen healthy values (Lillis et al., 2009). ACT interventions for obesity have been evaluated in a number of laboratory settings and clinical trials.

In a laboratory experiment, ACT skills (defusion and acceptance) were compared to traditional behavioral skills (distraction and cognitive restructuring) for craving experiences and consumption of chocolate among persons reporting high sensitivity to food in the environment. Acceptance skills were shown to reduce cravings and the consumption of chocolate compared to control strategies (Forman et al., 2007). In another study thought suppression was compared to defusion. Participants receiving defusion strategies consumed significantly less chocolate than the participants receiving suppression (Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012).

In one clinical treatment trial, ACT was evaluated for participants who had completed a 6-month weight loss program (n = 84). Participants were randomly assigned to either a 1-day ACT workshop accompanied by a workbook or a waiting list. The ACT workshop was setup in a group format and focused on enhancing psychological flexibility in relation to weight-related stigmatizing thoughts, feelings, and bodily sensations. The ACT intervention did not include any strategies for losing weight, but aimed at teaching participants to live a meaningful life in accordance with their own values. At a 3-month follow-up, participants who received ACT showed improvements in distress, stigma, and quality of life and had lost more weight than the waiting list group. Mediational analysis showed that the changes in outcome variables occurred through enhanced psychological flexibility (Lillis et al., 2009).

In an exploratory single-group design, participants (n = 29) received an acceptance-based behavioral intervention (Forman et al., 2009). The inter-
vention was developed from a combination of the LEARN-program previously presented in this thesis (Brownell, 2004) and ACT interventions (Hayes, Strosahl, & Wilson, 1999). Principles drawn from the LEARN manual included dietary, nutritional, and behavioral strategies. However, cognitive interventions, such as modification of thinking in the LEARN program, were replaced by interventions of acceptance, mindfulness, and defusion. Individuals who completed the program had lost 6.6% of their body weight at a 6-month follow-up. In addition, significant decreases were observed for emotional eating (Forman et al., 2009).

In a randomized controlled trial participants who attempted to lose weight were recruited via advertisement. ACT was evaluated against a control condition. Participants in the ACT group went to three workshops over the course of 3 weeks, for a total of 8 hours. At a 6-month follow-up, participants who still followed the ACT principles had lost significantly more weight and performed significantly more exercise compared to the waiting list group. Reductions in excess weight were mediated by reductions in binge eating (Tapper et al., 2009).

Another contextual behavioral intervention for obesity is specific methods of mindfulness (Baer, Fischer, & Huss, 2005; Kristeller & Hallett, 1999; Smith, Shelley, Leahigh, & Vanleit, 2006). Mindfulness aims at decreasing the risk of emotional eating. One example of such a program is Mindfulness-Based Eating Awareness Training (MB-EAT) developed for participants with obesity and binge eating behavior. The intervention focuses on mindfulness regarding awareness about cues related to the body and eating. In one trial, participants receiving MB-EAT reported a significantly reduced frequency of binge eating after the intervention. In addition, the time used to practice mindfulness influenced the magnitude of the reduction in binge eating (Kristeller & Hallett, 1999).

Considering the medical health risks with obesity, weight loss is important (Berrington de Gonzalez et al., 2010; Janssen et al., 2004; Kopelman, 2000; Pi-Sunyer, 1993). The only intervention to date with observed long-term effects on weight loss is bariatric surgery. The combination of surgery and behavioral interventions may be needed for solving problems with both weight loss and well-being after surgery (Mechanick et al., 2008). In the next section a brief description of research on bariatric surgery, followed by a description of documented psychological problems after surgery, is presented. This will be followed by the presentation of the acceptance-based approach for post-bariatric surgery which has been used in this dissertation.
Bariatric surgery: Best Evidenced based Intervention for Long-term Weight Loss

The medical health risks associated with obesity together with the failure of long-term effectiveness of the behavioral weight loss interventions, have led to an increased use of bariatric surgery (Elder & Wolfe, 2007). In 2002, 800 operations were performed in Sweden, compared to 8500 in 2011 (Scandinavian Obesity Surgery Register, 2011).

The National Institutes of Health (1998) recommends surgical interventions for the treatment of individuals with severe obesity (body mass index [BMI] ≥ 40) or with moderate obesity (BMI = 35-39) with serious health comorbidities. In 2008, a total of 146,301 bariatric surgery operations were performed by 2,839 bariatric surgeons worldwide. In USA and Canada, 103,000 of these operations were performed by 850 surgeons (Buchwald & Oien, 2009). In contrast to previously evaluated treatments for obesity, bariatric surgery is associated with weight loss, long-term maintenance of the weight loss, and improvements in co-morbid medical conditions (Buchwald et al., 2004; Christou et al., 2004; Karlsson, Taft, Ryden, Sjostrom, & Sullivan, 2007; Maggard et al., 2005).

The weight loss is produced by several factors, which are different for each surgical method. In general, the surgical procedure induces malabsorption of calories, reduction in caloric intake, early satiety, dumping syndrome as a consequence of high-fat and high-sugar foods, and reduced hunger due to decreased ghrelin secretion (Dowd, 2005). The two most common surgical procedures are gastric bypass (GBP) and laparoscopic sleeve gastrectomy (LSG). None of the procedures are reversible.
In GBP procedures, the upper stomach is divided to create a small gastric pouch about the size of a walnut (see figure 1). A portion of the intestine, specifically the jejunum, is connected to a hole in the pouch. Because of this procedure food will bypass the first part of the intestine and fewer calories will be absorbed. Together with technical advances, the procedure has been developed over the last 30 years and implemented with multiple modifications. However, the size of the gastric pouch most often has a 20-30 mL capacity (Elder & Wolfe, 2007). The goal with a small pouch is to produce early satiety. Furthermore, malabsorption results from the intestinal bypass. The processes of the change are not fully known, but probably include a complex interaction between restriction, malabsorption, behavioral changes, and neural and endocrine signals (Elder & Wolfe, 2007). In 2003, 90% of the surgical procedures performed for weight loss in Sweden were GBP procedures (Sundbom, 2009).

Laparoscopic sleeve gastrectomy is the second most common procedure. LSG is a new procedure as compared to gastric bypass. The first study with LSG was published in 2008, and since then about 30 studies have been published (Raul, 2012). By surgically removing 75% of the stomach, the size of the stomach is reduced. The mechanisms contributing to weight loss are restrictive but also hormonal, as the production of ghrelin hormone is dramatically reduced (Karamanakos, Vagenas, Kalfarentzos, & Alexandrides, 2008).
Successful long-term weight loss is defined as BMI less than 35 or a loss of more than 50% of excess weight (Elder & Wolfe, 2007). A Swedish study with 384 participants reported a mean BMI reduction to 32.5 kg/m² and excess weight loss of 63% 11 years after surgery. In addition, lasting improvements in medical conditions were observed (Edholm et al., 2012). The average weight loss for GBP patients is reported to be 43.5 kg at 1 year, and 41.5 kg at 2 years (Maggard et al., 2005). The mean percentage weight loss at 2 years is 61.2% for all bariatric surgery procedures, ranging from 47.5% for gastric banding to 70.1% for duodenal switch (Buchwald et al., 2004). In one of the largest trials, the Swedish SOS study, authors reported at a 10-year follow-up that the mean weight loss was 25% of excess weight for GBP patients (Sjöström et al., 2004).

Although surgery is associated with greater effects on weight loss and maintenance compared to traditional behavior treatments, approximately 10-40% of patients do not achieve a weight loss classified under morbid obesity (Biron et al., 2004; Christou et al., 2004; Ferchak & Meneghini, 2004; Karlsson et al., 2007; MacLean, Rhode, & Nohr, 2000).

The medical explanation of weight gain involves anatomical and physiological adaptations that occur over time after surgery. The stomach may stretch after a few years and, consequently, the early satiety produced by surgery is lost. Also, the remaining part of the intestines increases its capaci-
ty to absorb over time (Brolin, 1996; Marceau et al., 1995; Scopinaro et al., 1996). The main weight loss is accomplished in the first 12 to 18 months after surgery (Schauer, Ikramuddin, Gourash, Ramanathan, & Luketich, 2000). The first 2 years following surgery might be seen as a “psychological honeymoon”. One study showed that in the long-term patients undergoing surgery show similar psychological well-being as obese patients not having surgery (Buddeberg-Fischer, Klaghofer, Sigrist, & Buddeberg, 2004). In addition patients having surgery struggle with new dilemmas. They may attribute the weight loss success to a technical intervention and not their own efforts, they may be disappointed and want to lose more weight and they may have problems with food ingestion (Buddeberg-Fischer, et al., 2004).

There are medical complications associated with surgery. Common complications after gastric by pass include gastric dumping, gallstones and infections. The mortality rate is about 0.4 % after various types of gastric bypass. The numbers should be compared to control patients having a mortality rate of 0.6 % (Adams et al., 2007). Although considering risks with operation, bariatric surgery is associated with positive medical effects. Bariatric surgery patients have a 76% reduced risk of cancer, 82% reduced risk of cardiovascular disease, and 47% reduced risk of psychiatric and mental health problems compared to controls (Christou et al., 2004).

Bariatric surgery is generally associated with improved quality of life and mental health, and as previously mentioned, at least in the first 2 years (de Zwaan et al., 2002; Herpertz et al., 2003; Karlsson, Taft, Sjostrom, Torgerson, & Sullivan, 2003; Ronette L. Kolotkin, Crosby, Gress, Hunt, & Adams, 2009; Sarwer, Wadden, & Fabricatore, 2005; Gerbrand van Hout, Boekestein, Fortuin, Pelle, & van Heck, 2006). Some studies have shown a reversion to baseline levels of psychosocial distress after two years (Buddeberg-Fischer et al., 2006; Waters & Pories, 1991). However, results are mixed. In a recent study, GBP patients showed significant improvements in quality of life, as compared to nonsurgical obese controls at a 6 year follow-up (Kolotkin, Davidson, Crosby, Hunt, & Adams, 2012). There are reasons to believe that there are subgroups of patients with problematic behavioral patterns, in the bariatric surgery population. This will be presented in the next section.

Conditioned Behavioral Patterns

Bariatric surgery candidates have a long history of failed weight loss attempts and a pre-occupation with weight and body shape prior to surgery (Gibbons et al., 2006). A hypothesis is that years of struggles with weight and self-stigma may affect the adjustments after surgery. From a behavioral
learning perspective, cognitions and thoughts can diminish, but they are rarely eliminated and can be triggered by cues in context (Hayes et al., 2006).

Structured research on behavioral patterns after bariatric surgery is relatively novel. Some researchers have focused on, if psychopathology observed prior to surgery can predict post-surgical outcomes. Psychiatric disorders seem to be common among bariatric surgery candidates. Sarwer et al. (2005) reported that 20% to 60% of candidates have a psychiatric disorder before surgery. Mixed prevalence estimates may be associated with candidates’ fear of being excluded from surgery if they report psychiatric symptoms. In a recent assessment patients were informed their reports would not have any impact on the decision concerning surgery (unless it was extreme high-risk behaviors). In this group of 199 patients, the lifetime and current rates of psychiatric disorders were high. Thirty-four percent reported a current Axis 1 disorder and 69% a lifetime Axis 1 disorder (Mitchell, et al., 2012). Rates are greater than in the general population (Mitchell, et al., 2012). Psychiatric comorbidity may not be predictive of weight loss outcomes, however. In a systematic review, the authors concluded that no reliable and valid pre-operative psychosocial predictors are available for post-surgical weight loss (Gerbrand van Hout, Verschure, & Van Heck, 2005).

Several issues should be highlighted in light of outcomes post surgery.

First the follow-up periods in studies examining the predictive ability of pre-psychological variables, are often short, that is under three years following surgery. Second, measurements procedures vary and there are no golden standards on how to assess psychological profiles in this group of patients. Varying procedures make it hard to compare studies and may give the impression of mixed results.

Third, pre-operative behaviors might not be predictive of weight success, but postoperative behaviors might predict the ability to control weight. Future research should focus more on the predictive value of postoperative behaviors. Fourth, success following surgery should not only include weight loss and weight maintenance. Patients who have satisfactory weight loss can still suffer from body dissatisfaction, poor eating behaviors, and negative emotional experiences. Therefore, improved quality of life and body image are also important goals of bariatric surgery that should be high-lighted in follow-up studies.

Relationship to the Body After Bariatric Surgery

To be eligible for bariatric surgery, a patient needs to show that other less invasive means have been exhausted. As mentioned previously, bariatric surgery candidates often have a history of struggling with weight and failed dieting attempts since adolescence (Gibbons et al., 2006). Behavioral patterns of struggling against the body may be well established and an important part of the self-evaluation, even after surgery. For example, signifi-
cantly more patients are willing to risk death, amputate a leg, become blind, or suffer from severe heart disease than achieve a weight loss of “only” 20% of their total body weight after surgery (Rand & Macgregor, 1991; Wee, Jones, Davis, Bourland, & Hamel, 2006). Expectations about changes in both weight and body shape are high prior to surgery, and patients often seem to have unrealistic goals (Wee et al., 2006). In addition, when some patients reach their goal weight, the magical number of success seems to move further down the scale and the patient ends up being disappointed with their weight, even though they have lost a large amount (Wee et al., 2006).

Even though some aspects of body dissatisfaction, such as physical attractiveness and feeling of fatness, seem to normalize up to 2 years after surgery (Dixon, Dixon, & O'Brien, 2002; Neven et al., 2002; Sarwer et al., 2010), weight loss is not directly associated with improvements in all aspects of body dissatisfaction after surgery (Sarwer et al., 2010). Aspects such as body de-evaluation and physical self-efficacy seem to remain after surgery (Adami, Meneghelli, Bressani, & Scopinaro, 1999). These results may reflect that inner feelings are partially independent of the actual body weight. This hypothesis is supported by evidence showing that the perception of oneself as obese seems to remain constant among former obese persons (Annis et al., 2004). The perception of oneself as obese, regardless of weight status, has been called “phantom fat” (Annis et al., 2004).

Bariatric surgery patients still give psychological and emotional meaning to being overweight, which may reflect a body image disturbance similar to that of patients with eating disorders (Adami et al., 1999). Fear of weight gain seems to be common in both anorectic patients and among half of bariatric surgery patients after surgery (Kinzl, Traweger, Trefalt, & Biebl, 2003). Years of weight cycles may have established a chronic fear of gaining weight. Therefore, inner feelings, independent of actual weight, may interfere with quality of life after surgery.

New types of pre-occupating thoughts and behaviors related to the body can develop after surgery. Fifty percent of bariatric surgery patients have been reported to be dissatisfied with excess skin, abdominal flaps, and pendulous breasts (Kinzl et al., 2003). After body contouring surgery, body image improves for a while, but this seems to only be a temporary relief in dissatisfaction as new parts of the body become the targets of change (Song et al., 2006).

A decline in quality of life has been observed 1 year after surgery, which may be associated with reported body concerns (van der Beek, Riele, Speeken, Boerma, & van Ramshorst, 2010). Acceptance of the body shape and figure seem to be an important target of treatment following bariatric surgery.
Individual Behavioral Analyses of Body Dissatisfaction

Notably, even though large-scale studies give indications of psychological bariatric surgery issues, individual behavioral analyses are needed to determine the function of behavior after surgery. Conditioned patterns related to the body are learned in contexts. Different kinds of challenges and ways for relating to those challenges should be expected for different patients. For example, a subgroup of persons with severe obesity, seems to find weight loss and “becoming more attractive” threatening (Felitti, 1993; Wiederman, Sansone, & Sansone, 1999). This psychological dilemma may, in turn, trigger sabotage of weight loss success, through behaviors such as overeating (King, Clark, & Pera, 1996). Even though the form of behaviors, such as binge eating or fighting against the body, might look the same for different patients, the function might differ. Therefore, though significant and fast changes in body weight occur after surgery, some bariatric surgery patients appear to maintain the psychological suffering associated with obesity, such as self-stigma and body dissatisfaction. Helping persons post-bariatric surgery to relate to those inner feelings in a new fashion appears to be essential. Another essential part intimately connected to the relationship with the body is eating behavior.

Eating Patterns After Bariatric Surgery

The conditions for eating change as a consequence of the surgical procedure. Stringent dietary guidelines are necessary after surgery, including eating a small amount of food (2.5 dL), eating regularly, eating very slowly, and avoiding high-fat and high-sugar foods (Faria, de Oliveira Kelly, Lins, & Faria, 2010; Parkes, 2006). Gastric bypass-induced changes in the patient’s gastrointestinal tract can cause a variety of nutritional and metabolic complications, including severe protein malnutrition (Malinowski, 2006). Patients who have undergone GBP need to take supplements daily (Parkes, 2006). Unfortunately, a substantial proportion of bariatric surgery patients fail to adapt to these dietary regimens, which may also be associated with poorer outcomes (Bond, Phelan, Leahey, Hill, & Wing, 2008; Colles, Dixon, & O’Brien, 2008; Malinowski, 2006; Parkes, 2006; White, Kalarchian, Masheb, Marcus, & Grilo, 2010). Previous conditioned patterns of rigidity, overeating, and emotional eating (Elfhag & Rössner, 2005; Spoor et al., 2006) may still have an impact.

The prevalence of binge eating among bariatric surgery candidates has generally been reported to be high, ranging from 2-49% (de Zwaan et al., 2010; Niego, Kofman, Weiss, & Geliebter, 2007). Binge eating measured before surgery is a predictor of the loss of less excess weight or weight regain in some studies (de Zwaan et al., 2010; Hsu, Sullivan, & Benotti, 1997; Macias & Leal, 2003; Sabbioni et al., 2002; Toussi, Fujioka, & Coleman,
In other studies, binge eating has not been replicated as a predictor (Alger-Mayer, Rosati, Polimeni, & Malone, 2009; White, Masheb, Rothschild, Burke-Martindale, & Grilo, 2006).

The form of eating behavior has been proposed to change, but the function of emotional relief by eating remains for some patients after surgery. Symptoms of binge eating prior to surgery usually reappear in different forms, such as subjective binge eating and loss of control over food, 18-24 months after the initial weight loss and honeymoon stage (de Zwaan et al., 2003; Niego et al., 2007). Pre-operative binge eating, characterized by the uncontrollable consumption of a large amount of food in a discrete period of time, might turn into postoperative grazing, characterized by frequent snacking and eating small amounts of food over long periods of time (Saunders, 2004). One report showed that 80% of the surgery candidates who reported binge eating before surgery reported a recurrent loss of control over eating 6 months after surgery (Saunders, 2004). In a study with an 8-year follow-up, half of the patients presented with symptoms of binge eating or night eating, which was correlated with less weight loss (Kruseman, Leimgruber, Zumbach, & Golay, 2010). Dysfunctional eating behavior measured after surgery has been a predictor of weight loss outcomes and quality of life variables (Berrington de Gonzalez et al., 2010; Colles et al., 2008; de Zwaan et al., 2010; Sallet et al., 2007; Saunders, 2004). The function of emotional relief from eating may reappear in new contexts after surgery. Before surgery, a substantial proportion (38-40%) of the bariatric surgery candidates have been reported to be involved in emotional eating behaviors (Guerdjikova et al., 2007; Walfish, 2004).

In sum, the long-term behavioral change needed for sustainable weight loss is dependent on several factors, including adaptations in eating behaviors. The bariatric surgery patients seem to require both medical and psychological expertise. The National Institutes of Health have published consensus statements on bariatric surgery. The importance of lifelong follow-up is stressed in the guidelines, and the panel recommends bariatric centers use multidisciplinary teams in the follow-up care (National Institutes of Health, 1991). One retrospective study found that the number of postoperative follow-up meetings correlated with successful weight loss (Peacock & Zizzi, 2011). Novel trials of behavior therapy in combination with bariatric surgery have recently emerged.

Behavior Therapy in Combination With Surgery

To date, the number of systematic studies on behavioral interventions after surgery is limited. The author of this thesis is aware of two published uncontrolled studies using strategies drawn from behavior therapy (Ashton, Heilberg, Windover, & Merrell, 2011; Leahey, Crowther, & Irwin, 2008) and
three randomized controlled trials (RCT) evaluating psychological interventions after surgery (Lier, Biringer, Stubhaug, & Tangen, 2011; Kalarchian et al., 2011; Weineland, Arvidsson, Kakoulidis, & Dahl, 2012). This is a small, but growing, area of research.

The first uncontrolled study evaluated a 10-week mindfulness based group intervention in a small group of seven participants who had undergone surgery and presented with difficulties regulating their eating after surgery. Participants had previously participated and failed with traditional weight loss programs prior to surgery. Hence, participants should have knowledge about common dietary guidelines, physical activity, and behavioral strategies. Therefore, mindfulness and acceptance, was hypothesized to have the additional ingredients needed to help participants handle emotions that trigger overeating. Results showed that mindfulness based strategies decreased binge eating and depressive symptoms, and enhanced participants’ skills to regulate emotions (Leahey et al., 2008). In the second uncontrolled study, a four-session CBT group program was evaluated for 128 participants presenting with binge eating, subjective binge eating, and loss of control over eating prior to surgery. The treatment was conducted before surgery and assessments made at 6 and 12 months post-surgery. The intervention was carried out in a group setting and included behavior strategies for obesity, such as self-monitoring, stimulus control, cognitive restructuring, relaxation, and stress management. The results showed that those who responded to the pre-operative CBT exhibited greater post-operative weight loss in the first post-operative year compared to non-responders (Ashton et al., 2011). These two uncontrolled studies are promising, and treatment strategies should be evaluated in more controlled studies.

In the RCT, a pre-operative 6-week CBT program, was compared to a control group (n = 141). At follow-up 1 year after surgery, no difference was found between the groups regarding weight loss, eating behaviors, or physical activity. The authors concluded that pre-operative psychological intervention does not seem to be beneficial. Postoperative interventions may be more fruitful (Lier, et al., 2011). In the second RCT, bariatric surgery patients who had failed to maintain successful weight loss 6 years after surgery were randomized to either a behavioral intervention (n = 18) or a wait-list control group (n = 18). The behavioral intervention aimed at developing realistic weight loss goals of 5-10% of the initial body weight, to decrease caloric intake through diet, and increase energy expenditure through physical activity. Participants were prescribed 1200-1400 calories a day and an exercise program. The behavioral strategies included self-monitoring and rewards for success with behavior goals. Group meetings and telephone contact were used over the 6 months. The results showed a trend of a greater percentage of excess weight loss in the intervention group than the wait-list control group at both 6 and 12 months; however, the difference was not significant (Kalarchian et al., 2011). The third published RCT in the field of
behavioral interventions and bariatric surgery was conducted in this thesis (Weineland, Arvidsson, Kakoulidis, & Dahl, 2012). The intervention is described next.

ACT and Bariatric Surgery

Today there is no established treatment method for ACT post bariatric surgery. However principals drawn from ACT can be applied for the bariatric surgery setting. From a contextual behavioral approach, dysfunctional behaviors such as emotional eating, reported following bariatric surgery, are behaviors which have been previously learned. Patterns of overeating for emotional relief and dieting in order to control body shape have been established over many years and in differing contexts prior to surgery. Bariatric surgery patients will still be confronted with inner rules concerning self-stigma, the body, as well as old habits of emotional eating after surgery.

From a contextual behavioral perspective, emotional eating and loss of control reported after bariatric surgery are overt examples of typical behavior patterns that relieves negative emotions in the short term but creates more anxiety and health problems in the long term. In an acceptance-based behavioral conceptualization the function of a behavior rather than the particular form of this behavior is in focus. For example, in the context of bariatric surgery, eating behaviors are forced to change, but it is unclear whether this also changes the function of over eating behavior, that is, to obtain emotional relief from unacceptable feelings or thoughts. Also, body weight in numbers may change after surgery, but the conditioned feelings, thoughts, and behavior can still be present.

An alternative way of relating to negative experiences is presented by the ACT model. The key is to act effectively, even when challenging experiences are present. As mentioned before, ACT interventions for obesity are not focused on weight loss per se, but aim at breaking unhealthy patterns of behavior and influence healthy behavior in an indirect way. The same holds for ACT post bariatric surgery. Some patients have been trying to change themselves as a function of self-stigma for many years prior to surgery, and to accept difficult inner experiences in the service of a healthy valued life is a new perspective. Proposed new strategies in treatment have their roots in the message “you are acceptable as you are”. In this way, behavioral changes in ACT for bariatric surgery patients are grounded in the context of acceptance and self-compassion. Self-compassion is a non-judgmental understanding of one’s pain, inadequacies, and failures, as well as opening up to one’s own suffering and recognizing one’s own experience as a part of the greater human experience (Neff, 2003). Participants use exercises aimed at evoking self-compassion. Mindfulness exercises are thought to evoke self-
Measuring Behavioral Patterns in the Context of Bariatric Surgery

Contextualization of post surgery circumstances regarding behaviors seem to be crucial for reliable assessment and screening. Two behavioral processes seem to be important in the post surgery setting: eating disordered behaviors and experiential avoidance regarding obesity related problems.

Assessing eating disordered behaviors such as binge eating in a reliable and valid way is quite a complicated task, which becomes even more complicated after bariatric surgery. Since eating behavior is forced to change after surgery there is a need to find new ways to identify and measure forms of disordered eating that may emerge among these patients. For example questions on binge eating should be formulated in such a way the volume of stomach in taken into consideration and “large amount” is contextualized given what is normal after surgery (Niego, et al., 2007). Over eating behaviors such as snacking frequently (Saunders, 2004) seem to be important to assess. Disordered eating behaviors may be accompanied by negative emotions, such as loss of control and shame, which also should be assessed. Even though clinical interviews (Colles et al., 2008; De Zwann et al., 2010) can be used for assessing eating disordered behaviors post surgery, there are only a few validated instruments evaluated in the bariatric surgery setting.

Experiential avoidance may be an important screening factor following bariatric surgery. Experiential avoidance has been shown to negatively correlate with quality of life and positively associate with psychological symptoms, such as depression and anxiety (Hayes et al., 2006; Ruiz, 2010). Experiential avoidance can be seen as existing on a continuum from inflexibility/avoidance to psychological flexibility. The most widely used measure of general experiential avoidance is the Acceptance and Action Questionnaire (AAQ) (Hayes et al., 2004). When AAQ is modified to specific populations, it seems to be more sensitive than the general AAQ. Versions of AAQ have been developed for epilepsy (Lundgren, Dahl, & Hayes, 2008), diabetes (Gregg et al., 2007), and obesity (Lillis & Hayes, 2008). The Acceptance and Action Questionnaire for Weight (AAQ-W) measures experiential avoidance among obese patients. Still, the AAQ-W has not been evaluated for bariatric surgery patients. An instrument measuring psychological flexibility with
regard to weight could also be used to evaluate processes of change in ACT delivered after surgery.

Measuring Processes of Change in Psychotherapy

In psychology, many questions involve chains of relationships with a triggering factor affecting another process called a mediator, which in turns affects an outcome. Mechanisms of change are of particular interest in intervention research. In most research the focus is on X and Y, where X is the independent variable that causes Y, the dependent variable (X→ Y). In mediation analyses, the chain is X→ M→ Y. Mediators are processes through which changes are considered to occur (MacKinnon, Fairchild, & Fritz, 2007). Interventions are designed to target the mediating and, in this way, affect the outcome. When outcomes are changed, in the absence of change, in a mediator, the underlying theory may not be correct.

Only a few studies in the field of eating disorder treatment have examined meditational variables (Bearman, Stice, & Chase, 2003; Stice et al., 2007). In one study, the hypothesized mediator was thin-ideal internalization. Elevated thin-ideal internalization was thought to increase body dissatisfaction, dieting, and overeating. Logically decreased levels of thin-ideal internalization were thought to decrease the other problematic behaviors. The results showed that the mediator correlated with changes in outcomes for dieting, negative effects, and bulimic symptoms. The changes in the mediator were, in most instances, observed before changes in outcome. Also, intervention effects became weaker when changes in the mediator were controlled for (Stice et al., 2007). With knowledge regarding the factors involved in intervention effects, more effective treatment protocols can be developed. The factors involved in change can then be targeted directly. In ACT, the hypothesis is that reductions in experiential avoidance and enhanced psychological flexibility mediate the effect of the intervention. The hypothesized mechanism is developed through interventions, such as acceptance, defusion, and commitment (Hayes et al., 2006). Different therapy orientations not only differ in theoretical assumptions and underpinnings, but also in their delivery format.

Cognitive Behavioral Internet Therapy (ICBT)

CBT is well suited for self-help interventions via the Internet, as it is structured and goal-directed (Andersson et al., 2008). Many different methods are available for conducting CBT via the Internet (called ICBT). In two reviews the effectiveness of psychotherapy delivered via Internet ha been confirmed (Andersson et al., 2008; Barak, Hen, Boniel-Nissim, & Shapira, 2008).
Psychological treatment partially administered via the Internet could be an option for bariatric surgery patients for two reasons. First, obesity is associated with self-stigma and shame (Annis et al., 2004) and Internet based treatment can be a way to reach those who avoid seeking help due to negative self thoughts (Cuijpers, van Straten, & Andersson, 2008). A large-scale study (n=7014) showed that those who suffer from stigmatizing conditions are significantly more likely to use the Internet for health care and communicate with clinicians via e-mail than those with non-stigmatizing conditions (Berger, Wagner, & Baker, 2005). Since bariatric surgery patients have a learning history of stigma, Internet based treatment may be a good fit for this group of patients. The second reason for using the Internet is the extent of obesity problems and increasing number of bariatric surgery operations per year (Kelly, Yang, Chen, Reynolds, & He, 2008; Scandinavian Obesity Surgery Register, 2011). Considering this, there should also be an expansion of available psychological treatments. More over, Internet is used worldwide, including in remote areas, and may provide treatment to a large number of persons with obesity to a relatively low cost (Kodama, 2012).

Guided internet-based self-help programs have been used successfully in the treatment of psychiatric disorders, such as panic disorder, agoraphobia, post-traumatic stress symptoms, depression, and social phobia (Cuijpers et al., 2008; Ritterband & Tate, 2009), as well as in the treatment of health problems, including chronic pain, insomnia, tinnitus, and headache (Cuijpers et al., 2008). ICBT is associated with advantages compared to traditional face-to-face treatment and is a cost effective treatment option (Cuijpers et al., 2008). ICBT interventions that include therapist support have a large mean effect size, whereas ICBT without therapist support is associated with smaller effect sizes (Palmqvist, Carlbring, & Andersson, 2007; Spek et al., 2004).

ICBT for Weight loss
The format for delivering treatment via the Internet has been used in behavioral weight loss trials. In a meta-analysis of 23 studies, Internet interventions were shown to be associated with a modest effect on weight control, at least in the short-term (Kodama et al., 2012). One large-scale RCT study with 481 participants showed that behavioral treatment conducted via face-to-face sessions can produce significantly greater weight loss compared to behavior therapy via the Internet only. However, the proportion of persons reaching a healthy weight loss of 5% did not differ between the group who received Internet intervention and the group that received face-to-face intervention (Harvey-Berino et al., 2010). Other studies have confirmed that the Internet is associated with a clinically significant weight loss of 5% (Micco et al., 2007; Tate, Jackvony, & Wing, 2006). One study showed that self-motivation, including optimism and commitment to change, during the web-
based weight loss treatment was associated with variations in weight loss results. Participants reporting more self-motivation used the web module more and lost more weight (Webber, Tate, Ward, & Bowling, 2010). Behavior-based podcasting (portable downloaded audio file) has been shown to be effective for weight loss, at least in the short-term (Turner-McGrievy et al., 2009). Web-based maintenance programs following behavioral weight loss treatment has also been evaluated. The Internet was as effective as continued face-to-face meetings in the maintenance phase after traditional behavioral treatments for obesity (Harvey-Berino, Pintauro, Buzzell, & Gold, 2004). One study showed that a standalone web-based program without therapy contact produced clinically important weight loss compared to a control group at the 3-month follow-up (Collins et al., 2012). ICBT has also been shown to be effective for persons with binge eating disorder (Carrard et al., 2011; Ljotsson et al., 2007).

The primary goals with behavioral treatment after surgery seem to be the development of healthy behaviors, reducing psychological suffering related to eating and the body, and enhancing quality of life. The model of ACT seems to fit these goals and would be worth examining. It has been acknowledged that treatment via Internet for post bariatric surgery should be evaluated (Thomas, Bond, Sarwer, & Wing, 2011). ACT as a psychotherapeutic intervention delivered via the Internet has been evaluated in a small number of studies. Mindfulness and exposure techniques delivered via the Internet have been shown to be effective for irritable bowel syndrome (Ljotsson et al., 2011) and tinnitus (Westin et al., 2011). ACT as an internet-based treatment manual post bariatric surgery seem to be worth evaluating.

Assumptions aims and research questions

Assumptions in this thesis were based on previous research and are as follows:

- Persons with obesity have a long history of failed weight loss attempts, and they are often faced with stigma and discrimination.
- Bariatric surgery is currently the only method associated with dramatic weight loss and weight maintenance.
- Bariatric surgery patients continue to struggle with self-stigma, body dissatisfaction, and emotional eating post surgery.
- Randomized controlled trials evaluating psychological interventions in combination with bariatric surgery are lacking.
- Acceptance and commitment therapy (ACT) targets experiential avoidance and aims to enhance psychological flexibility, the acceptance of having difficult feelings and thoughts, while simultaneously engaging in vital healthy activities.
• Evaluated assessment tools measuring psychological processes and eating disordered behaviors after surgery are lacking.

The first aim of the present thesis was to develop and evaluate a behavioral treatment method for people who have undergone bariatric surgery. The means to achieve this goal was to develop an ACT treatment intervention adjusted for the bariatric surgery setting and implemented via the Internet. The second aim was to evaluate adequate assessment instruments for the specific groups of bariatric surgery patients. The means to achieve this goal was to evaluate one instrument measuring experiential avoidance, the Acceptance and Action Questionnaire for Weight (AAQ-W), and another instrument measuring eating disordered behaviors in the bariatric surgery context, Disordered Eating in Bariatric Surgery (DEBS). The research questions were as follow below.

Study I
1. What are the effects of ACT compared to TAU following bariatric surgery in regards to eating disorder attitudes and behaviors, body dissatisfaction, quality of life and psychological flexibility?
2. Do participants experience the ACT intervention as meaningful?

Study II
1. What are the effects of ACT compared to treatment as usual (TAU) following bariatric surgery in regards to eating disorder attitudes and behaviors, body dissatisfaction, and quality of life at a six month follow-up?
2. Do post-treatment changes in psychological flexibility mediate outcomes (eating disorder attitudes and behaviors, body dissatisfaction, and quality of life) at a six month follow up?

Study III
1. Does AAQ-W possess high test-retest reliability?
2. What is the validity of the AAQ-W, evaluated through correlations with measures on general experiential avoidance, body dissatisfaction, eating disorder attitudes and behaviors, emotional over eating, satisfaction with life and negative emotional states?
3. What is the factor structure of the AAQ-W?

Study IV
1. Does DEBS possess high test-retest reliability?
2. What is the validity of the DEBS, evaluated through correlation with measures on eating disordered attitudes and behaviors and emotional over eating?
   What is the factor structure of the DEBS?
Ethical considerations

The research projects, was approved by the ethical committee in Uppsala Sweden. All participants received verbal as well as written information about the purpose and data collection. Participants were informed that participation was voluntary and that they at any time had the opportunity to withdraw their participation. Participants were also informed that their data would be kept confidential. Finally participants signed an informed consent.

Throughout the research project participants had continued contact with a psychologist (author of this thesis) as well as, the operating surgeon and the bariatric surgery team. Negative feelings can emerge when filling in measures, therefore participants in all four studies, had the opportunity to contact the psychologist at any time both during and after the participation. For ethical reasons it was decided that the participants in the treatment as usual condition (TAU) should receive ACT after the six month follow-up. The ACT intervention was partly delivered via Internet. The Internet treatment did not contain interactive material, such as writing exercises with immediate feed-back. Instead writing exercises could be printed out and discussed by telephone with the psychologist. In this it way it was ensured that nothing personal was recorded on Internet.
Empirical Studies

In a medical setting, such as bariatric surgery, it is not certain that patients will accept psychological treatment. Therefore, careful design of the treatment manual and web modules was important for the aim of this thesis. The Internet-based ACT intervention was developed through several steps, including single-subject designs in the clinical setting. Adjustments were made based on how the intervention was received by the participants. The final step in the development of the treatment model is presented as empirical, published RCTs in this thesis. Three of the four empirical studies are published in two scientific journals: *Obesity Research and Clinical Practice* and *Clinical Obesity*. Below follows four summaries of the four empirical articles.

Study I: Acceptance and Commitment therapy for Bariatric Surgery patients - a Pilot study

Introduction

Bariatric surgery is the treatment of choice for severe obesity and is generally associated with maintained weight loss and improved quality of life and mental health (Karlsson, et al 2007). However, persons undergoing bariatric surgery have a long history of conditioning regarding the body and eating (van Hout & van Heck, 2009). Negative self-stigmatization is a psychological phenomenon that appears to remain intact following successful bariatric surgery. Even though body shape and weight significantly change as a result of surgery, the long-term conditioning of self-stigmatization is likely to still have an impact. The distressing pre-occupation with weight remains unchanged, despite attaining normal weight (Adami et al., 1999; Kinzl et al., 2003). In addition, though bariatric surgery creates structural restrictions for eating behavior, the tendency to control feelings by eating may remain (Berrington de Gonzalez et al., 2010; Colles et al., 2008; de Zwaan et al., 2010). In Acceptance and Commitment therapy (ACT), a recent development within cognitive behavior therapy, the target of change is emotional or experiential avoidance (Hayes et al., 2011). In this first study, ACT via the Internet and treatment as usual (TAU) were evaluated. The ACT intervention could
be a low cost, non-invasive, and effective treatment complementing in the bariatric surgery setting.

**Aim**

The purpose was to investigate the short-term effectiveness and clinical utility of ACT conducted partly via the Internet, as well as explore to which degree participants perceive the ACT intervention as meaningful. The study aimed to be explorative and inclusive, as this is one of the first behavioral studies conducted in the field of post-bariatric surgery. The results from this study could be used in the future for larger and more comprehensive studies.

**Method**

The study was a randomized control group design with repeated measures (n = 39). The design was mixed, condition × time. Participants were recruited from a bariatric surgery clinic and underwent screening before randomization into one of two conditions: ACT (n = 19) or TAU (n = 20). Measures were taken before and immediately after the intervention. Inclusion criteria were: underwent bariatric surgery a minimum of 4 months prior, ability to come to the clinic for in-sessions, and able to log in to the Internet. Exclusion criteria were: not having any symptoms of severe depression or having attempted suicide during the previous 2 years. The sample was predominantly female (n = 35). The mean age was 43 (range 25-59). The total sample had been obese for an average of 23 years and experienced 20 years of failed weight loss attempts prior to surgery. The mean time since the surgical procedure upon entering treatment was 15.5 months. Pre-operative BMI averaged 37 and mean post-operative BMI at the start of the study was 27.

The ACT treatment included two face-to-face sessions and six weeks of home-based intervention via the Internet. The initial face to face session entailed an exercise called the Life-Line. The Life-Line is an experiential metaphor that entails physical experiences of being on the life line, a metaphor for being present in life, and stepping off the life line into a dead end. The exercise involved physical role-playing in which the participant used examples from his/her own life. A line was drawn on the floor to illustrate the valued direction. The participant began by declaring values in life. Next the participant was asked to present 3 examples, one from childhood, one from adolescence and one from adulthood, where he/she was aware that he/she had stepped off the valued direction, for example by using food for emotional relief. The therapist helped the participant to see that eating is an example of experiential avoidance, that is, ways in which he/she has learned to manage unacceptable feelings. In the Life-Line exercise behavior functions of avoidance and/or craving are transformed via discrimination training, and acceptance, and defusion strategies modeled by the therapist (Dahl...
et al., 2009). The therapist helped the participant to stay with unacceptable emotions in a non-judgmental acceptance mode while standing on the life line in the valued direction. More behaviors of avoidance were sampled in this way, such as, severe dieting, isolating at home, avoiding physical activity or other self-destructive behavior patterns. The therapist demonstrated how behavioral patterns of experiential avoidance are re-actualized in different contexts throughout life. In the last part of the exercise, the participant was asked to practice flexible ways to relate to the unacceptable emotions, such as using acceptance and defusion techniques, while staying ‘on the line’ or doing things that he/she value in life.

The Internet program included psycho-educational texts, writing exercises, movies and audio files. Week one included two web modules called “Direction” and “Life-Line”, which focused on values. The “Life-Line” module was intended to teach the participant how to analyze behaviors in everyday life. The focus was on function (purpose) of behaviors in contexts and learning to discriminate experiential avoidance from approaching values in life. The “Direction” module aimed at helping the participant to contact meaningful and valued experiences in life. Writing exercises involved writing down important qualities in life and activities associated with vitality and life flow. Movies of activities, such as yoga, painting, playing golf and belly-dancing were provided to inspire the participant. Audio instructions included mindfulness exercises, such as imagining valued situations and discriminating in the body when experiencing a valued direction.

Week two included two modules called “Willingness to carry my emotions” and “Self compassion”, which focused on acceptance and self-as-context. The first module aimed at presenting an alternative to avoidance of feelings. Strategies and acceptance exercises were used, such as writing oneself a love letter. Mindfulness exercises aimed at enhancing acceptance of the body. For example the participant was instructed to feel every part of the body in a non-judgmental and open mode. The second module “Self compassion” provided the participant with the opportunity to explore the observing self. An observing point of view based on a non-judgmental understanding of one’s pain as well as opening up to one’s own suffering and recognizing one’s own experience as a part of the greater human experience was promoted. Two animated movies were provided. One of them illustrated a tree undergoing different seasons showing how emotions were like the weather (always changing) and the observer self is like the tree (always there observing).

Week three included two modules “In the service of” and “Nutrition for you”, which focused on teaching how to do functional analysis of behaviors. In the first module the participants learned how to categorize behaviors based on their functions rather than their form. Three movies illustrated functional behavior patterns of experiential avoidance as well as approaching values in life. The second module ”Nutrition for you” intended to explore
emotional eating, as well as strategies for handling negative emotions and values associated with eating healthy. For example writing exercises regarding behavioral eating patterns were used. An example of a mindfulness exercise in relation to food was asking the participant to drink a cup of tea and experience it with all sensations.

Week four included two modules named “Feedback from life” and “Dance with your thoughts”, which focused on present moment and defusion. The first module intended to teach participants how to direct attention to the present moment. Exercises included audio played mindfulness. The second module “Dance with your thoughts” introduced defusion methods. The aim of this module was to help the participant to disentangle from negative thoughts by seeing them as something the mind had produced rather than absolute truths. Exercises include for example animated movies. In one movie the participant was instructed to dance with negative or unacceptable words about his/her self. In the exercise the participant was motivated to experience that the former unacceptable word was just syllables and sounds, not absolute truths.

Week five included two modules, “My body, my garden” and “Body movements and activity”, which focused on acceptance and committed action. The first module aimed at exploring the participant’s relationship with his/her body. Movies were used to inspire the participant to valued actions in relation to the body. The second module inspired to physical activity based on self-compassion, rather than negative thoughts and wanting to change the body shape. A perspective of observing the body as a human function was introduced in the module. For example the participant observed the heart beating and muscles moving when sitting still and being in motion.

Week six included two modules, “The sight of your lighthouse” and “Wise words”, which focused on a committed action and summing up the treatment. Participants were given the opportunity to re-do previously presented exercises, as well as formulate a plan for how to continue work with the strategies learned during treatment. The module sought to help the participant maintain the behavioral changes he/she had achieved. During this last week, a final face to face session took place at the clinic and the therapist explored barriers for continued behavioral changes after treatment, as well as how to handle these barriers. Phone contact was made each week for approximately 30 minutes. During the first session, using the Life-line exercise, a behavioral analysis was performed for every participant and used for guiding the phone contact. Participants discussed what they had been working with, barriers to change, and steps that they had taken in valued directions. The therapist used the analysis to help the participant become aware of patterns of experiential avoidance and alternative flexible ways to stay in her valued direction.

The TAU intervention included standard follow-up procedures, including dietary advice provided by the bariatric surgery team. The support was ad-
justed for each individual. For example, the participant could use food diaries and receive feedback from the dietitian.

From pre to post measures 4 participants dropped out in the ACT group. Three of those did not come to the first session and did not receive the intervention. One more person dropped out during the intervention, due to a lack of time for participating. Two persons dropped out in the TAU condition from pre to post.

**Measurements**

To measure the effectiveness of treatment, participants filled in self-assessments. The Eating Disorder Examination Questionnaire (EDE-Q) is a questionnaire that measures eating behaviors and attitudes. The form contains four subscales: restraint (restraint), eating concerns (eating), shape concerns (shape), and weight concerns (weight). EDE-Q has shown good correspondence with the structured interview Eating Disorder Examination (EDE) and is stable over time (Luce & Crowther, 1999). The psychometric properties of the EDE-Q have been evaluated among obese candidates for bariatric surgery. The scale shows satisfying properties. However, the authors concluded that the questionnaire should not be used to identify binge eaters among bariatric surgery candidates. In this population, binge eating is not yet fully understood (Kalarchian, Wilson, Brolin, & Bradley, 2000). The Disordered Eating in Bariatric Surgery (DEBS) is a measure of a range of disordered eating behaviors post surgery. The items are adjusted for the specific conditions in the context of bariatric surgery. The questions involve, for example, snacking and feelings of shame associated with overeating. The instrument was developed as a part of this thesis and possess satisfactory test-retest reliability, validity and internal consistency (Ghaderi, Alfonsson, Dahl & Weineland, Study IV). In the published version of study I, DEBS is called the Subjective Binge Eating in Bariatric Surgery Questionnaire (SBEQ). Later the name of the scale was changed to Disordered Eating in Bariatric Surgery (DEBS, see Study IV). The Body Shape Questionnaire (BSQ) measures concerns about body shape and body dissatisfaction. The short form of the BSQ that contains 14 items was used in this study. In this measure, participants are asked to rate the degree to which they agree with a series of statements. The BSQ shows high test-retest reliability, internal consistency, and validity (Ghaderi & Scott, 2004). The World Health Organization Quality of Life - BREF (WHOQOL-BREF) is a 26-item self-assessment form examining the quality of life in four domains: physical health, mental health, social relationships, and environment. Cross-cultural investigations have shown that the WHOQOL-BREF has acceptable internal consistency and good psychometric properties with regard to both reliability and validity (Skevington, Lotfy, & O’Connell, 2004). The Acceptance and Action Questionnaire for Weight (AAQ-W) is a process measure designed as a self-
assessment form containing 22 statements. The AAQ-W measures weight-related thoughts and feelings interfering with valued action. A higher score reflects more experiential avoidance and a lower score more psychological flexibility. The AAQ-W has been validated in a clinical obesity setting (Lillis & Hayes, 2008) and in a bariatric surgery setting, as a part of this thesis (Study III: Weineland, Lillis & Dahl, 2012). AAQ-W possesses satisfactory test-retest reliability, validity and internal consistency. An evaluation form for assessing meaningfulness of the intervention was designed.

Statistical analysis
Analysis was based on carrying forward the last observation of the intent-to-treat analysis. Missing post-treatment data were replaced with pre-treatment values for six participants (15%). To examine interaction effects, mixed ANOVA with repeated measures (two groups and two time periods) was performed. Partial eta square effect sizes were calculated to measure the size of the effect. To detect the position of differences, post hoc analysis with pair-wise t-test were used. When the populations overlap, which is the case in most of the parameters in psychotherapy research, post-treatment scores can cross the cut-off point for significance but not be statistically reliable (Jacobson & Truax, 1991). Reliable change can be measured using the formula for the Reliable Change Index (RCI). RCI is based on the change in the client’s score from pre to post treatment divided by the standard error of difference between the pre and post test. If the RC is greater than 1.96 then it is highly likely that it reflects real and reliable change. Differences between groups regarding proportions of participants showing clinical significant improvement was analyzed by using Chi square test.

Results
The results of the study showed significant interaction effects for eating disorder attitudes and behaviors measured with EDE-Q ($F(1,37) = 4.23, p = .047$), subjective binge eating measured with SBEQ ($F(1, 37) = 8.38, p = .006$), body dissatisfaction measured with BSQ (TAU, $F(1, 37) = 5.65, p = .023$), quality of life measured with WHOQOL ($F(1, 37) = 7.65, p = .022$), and psychological flexibility measured with AAQ-W ($F(1, 37) = 8.59, p = .006$). The effect size was medium for eating disorder behaviors ($\eta^2 = .1$) and large effect for quality of life ($\eta^2 = .13$) and body dissatisfaction. The size of the effect for subjective binge eating ($\eta^2 = .19$) and psychological flexibility was large ($\eta^2 = .18$). The ACT group significantly improved in every contrast comparison, while TAU did not improve.

Table 1 presents percentage of improved and unimproved participants on outcome variables in each condition post intervention. For example the results showed that 53% of patients who underwent ACT improved reliably
and 6% undergoing TAU improved regarding shape concerns in post-treatment measures. Regarding weight concerns, 47% of patients undergoing ACT improved and 22% undergoing TAU improved. Differences were small, almost non-existent, regarding the total scale of EDE-Q. Regarding body dissatisfaction measured with BSQ, 27% of patients undergoing ACT and 6% undergoing TAU showed improvement. The observed frequencies of reliable change did not differ significantly between groups.

Table 1
Reliably improved presented as percentage (%)

<table>
<thead>
<tr>
<th>Measure</th>
<th>ACT (n = 15)</th>
<th>TAU (n = 18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDE-Q tot</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>EDE-Q shape</td>
<td>53</td>
<td>6</td>
</tr>
<tr>
<td>EDE-Q weight</td>
<td>47</td>
<td>22</td>
</tr>
<tr>
<td>EDE-Q restraint</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>EDE-Q eating</td>
<td>27</td>
<td>17</td>
</tr>
<tr>
<td>BSQ</td>
<td>27</td>
<td>94</td>
</tr>
<tr>
<td>WHOQOL-BREF</td>
<td>20</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: EDE-Q = Eating Disorder Examination Questionnaire, Shape = subscale in EDE-Q, Weight = subscale in EE-Q Restraint subscale = the EDE-Q Eating = subscale in EDE-Q, SBEQ = Subjective Binge Eating Questionnaire for Baratric Surgery patient, BSQ = Body Shape Questionnaire, WHOQOL-BREF = World Health Organization Quality of Life – BREF

All participants who completed treatment in the ACT group (n = 15) answered yes to the question “Would you recommend this treatment to someone else?” Participants’ rating of the meaningfulness of each element in the treatment are shown in table 2.
Table 2  
*Treatment acceptability completers in ACT (n = 15)*

<table>
<thead>
<tr>
<th>Question</th>
<th>M (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, how meaningful did you find the treatment to be?</td>
<td>6.53 (.64)</td>
<td>5-7</td>
</tr>
<tr>
<td>How meaningful has the treatment been for you as a bariatric surgery patient?</td>
<td>6.33 (1.29)</td>
<td>2-7</td>
</tr>
<tr>
<td>Overall, how meaningful has the focus of treatment been?</td>
<td>6.47 (.74)</td>
<td>5-7</td>
</tr>
<tr>
<td>How meaningful have the individual sessions been?</td>
<td>6.27 (1.34)</td>
<td>2-7</td>
</tr>
<tr>
<td>Overall, how meaningful have the web modules been?</td>
<td>6.07 (1.39)</td>
<td>2-7</td>
</tr>
<tr>
<td>How meaningful have the mindfulness audio files been?</td>
<td>6.13 (1.25)</td>
<td>3-7</td>
</tr>
<tr>
<td>How meaningful have the movies been?</td>
<td>5.73 (.96)</td>
<td>4-7</td>
</tr>
<tr>
<td>How meaningful have the texts been?</td>
<td>6.27 (.80)</td>
<td>5-7</td>
</tr>
<tr>
<td>How meaningful have the writing exercises been?</td>
<td>5.87 (.15)</td>
<td>1-7</td>
</tr>
</tbody>
</table>

*Note:* Questions regarding elements in the ACT treatment intervention are answered on a scale 1-7. 1 = Not meaningful, 4 = neutral, 7 = very much meaningful.

**Discussion**

The aim of Study I was to evaluate a novel ACT intervention adjusted for bariatric surgery patients. The results measured directly after treatment suggest that persons undergoing bariatric surgery may benefit from additional behavioral treatment after surgery. Persons receiving ACT exhibited significant improvements in disordered eating behaviors, body dissatisfaction, quality of life, and psychological flexibility compared to TAU. ACT emphasizes exposure to and acceptance of previously avoided thoughts and feelings, along with encouragement in taking steps in valued living. The adjusted treatment intervention, designed to be used via the Internet, seemed to have influenced the observed changes. This study contributes to the existing research, as evaluated treatment interventions are lacking in the post-surgical clinical setting. The study also presents a theoretically sound treatment model and manual that can easily be replicated in other bariatric surgery settings. However, methodological problems exist. First, the number of participants is low. Second, the post-treatment measures were taken immediately after treatment. Third, no objective evaluations were used, such as weight loss or weight maintenance. Considering the promising initial results, ACT should be evaluated further. Future research should include longer follow-up, objective measures and evaluation of specific psychological processes of change that are the key to the observed effects.
Study II: Psychological Flexibility and the Gains of Acceptance-based treatment post Bariatric Surgery: Six-month follow-up and test of the Underlying Treatment Model

Introduction
There is a growing interest in combining bariatric surgery with psychological interventions to help manage post-operative issues, such as self-stigma, body dissatisfaction, and emotional eating. Although uncontrolled treatment studies have been published (Ashton et al., 2011; Leahey et al., 2008), to our knowledge there are only three published randomized controlled trials (Kalarchian et al., 2011; Lier, Biringer, Stubhaug, & Tangen, 2011). One study examined the impact of acceptance and commitment therapy (ACT) compared to treatment as usual (TAU) in a sample of post surgery patients reporting core eating disordered pathology and body dissatisfaction. The initial results were promising (Weineland, et al., 2012). Follow-up data and the relationship between processes of change and outcomes were not examined in this first study on ACT for bariatric surgery patients. Therefore Study II seeks to test the hypothesis that psychological flexibility accounts for intervention effects on outcomes.

Aim
The aim of this study was to evaluate the effects of ACT as compared to TAU at a six month follow-up. The hypothesis was that the improvements in the ACT group are maintained at a 6-month follow-up and that changes are associated with the level of psychological flexibility among participants.

Method
Participants from study I were contacted for follow-up assessments 6 months after the intervention. Six participants dropped out from pre to post and four more from post to follow-up 3 more were lost. A total of twenty-nine participants (74%) completed the follow-up assessments. After the conclusion of follow-up assessment, participants in TAU also received ACT. Thus, at that point all participants received ACT and follow-ups longer than 6 months are not possible in the current thesis.
Measurements

The previously described EDE-Q, SBEQ/DEBS, BSQ, WHOQOL-BREF, and AAQ-W measures were used at the 6-month follow-up. Internal consistency was calculated based on the current samples pre-assessment. A good internal consistency was observed; WHOQOL ($\alpha = .88$), EDE-Q total ($\alpha = .95$) BSQ ($\alpha = .96$), SBEQ ($\alpha = .85$). AAQ-W ($\alpha = .88$). Value attainment was evaluated. Bull's Eye is a measure for estimating value attainment and persistence when encountering barriers. The measure contains a dartboard where the participant can place how close he or she is living according to the values they have chosen in four life areas: relationships, health/self-care, work/education, and leisure. The center of the dartboard represents living fully in accordance with values, and the edges far from living in accord with values. Using a 1-7 scale placed on the dartboard, the participants reported to what extent they had acted according to values during the last week in each of the four life areas. A higher score means living more according to values. Bull's Eye has a test-retest reliability of 0.86 and good criterion-validity (Lundgren, Luoma, Dahl, Strosahl, & Melin).

Statistical analysis

The effects interaction between condition (two conditions) and time (three time points) was evaluated using mixed model repeated measures (MMRM). The advantages of MMRM compared to repeated measures of ANOVA include a superior model for handling missing data. MMRM uses all available data for all participants and adjusts for missing data and patterns in the obtained data associated with drop out; thus, MMRM is well suited for intent-to-treat analysis. In all cases, the simplest model, compound symmetry, best fit the data. Effect sizes (Cohen's $d$) for $F$ values were based on the method suggested for repeated measures and multilevel designs by Rosenthal and Rosnow (1991) and for MMRM contrasts as specified by Wackerly, Mendenhall, and Scheaffer (2008). Effect sizes were discussed using the cutoffs suggested by Cohen (1988): small > .20, medium > .50, and large > .80.

Mediation refers to a statistical difference between the direct path (treatment on outcome or $c$) and the indirect path (treatment on outcome accounting for the mediator or $c'$). This difference can best be assessed (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002) by testing the significance of the cross-product of the “$a$ path” (treatment on the mediator) and “$b$ path” (relation of the mediator to outcome, controlling for treatment), which is mathematically equivalent to the difference between the $c$ and $c'$ path (Preacher & Hayes, 2004). In study II, mediation analyses examined whether post-treatment psychological flexibility measured with AAQ-W mediated quality of life measured with WHOQOL, disordered eating behaviors and
attitudes measured with EDE-Q and body dissatisfaction measured with BSQ at follow-up, adjusting for the initial levels of the respective measures and body mass. Because the cross products of the coefficients is generally not normally distributed, a non-parametric approach was used (Preacher & Hayes, 2004) based on bootstrapping, in which \( k \) samples of the original size are taken from the obtained data (with replacement after each specific data point is selected), a cross product test is then calculated in each sample. In the present set of analyses, parameter estimates were based on 3,000 bootstrap samples. The bias corrected and accelerated 95% confidence intervals are similar to the 2.5 and 97.5 percentile scores of the obtained distribution of the cross products over the \( k \) samples, but with \( z \)-score based correction for bias due to the underlying distribution (Preacher & Hayes, 2004). If the confidence intervals do not contain zero, the point estimate is significant at the level. Because the cross-products of the coefficients are generally not normally distributed, a non-parametric approach was used based on bootstrapping. The method developed by Preacher and Hayes (2004) allows the analysis of multiple mediators. Values that reached significance were analyzed.

Results

The overall main results showed a significant effect for time, no effect for condition, and a significant time \( \times \) condition interaction, see table 3 for results of the MMRM analysis. Across the outcomes showing a significant time \( \times \) condition interaction, the average between condition effect size was large after treatment (\( d = .95 \)) and medium at follow-up (\( d = .62 \)). Interactions occurred in most instances because patients receiving ACT exhibited significant and large improvements from before treatment to after treatment and follow-up, whereas those in the TAU group did not improve. Differences regarding ACT and TAU between pre-treatment to follow-up changes was significant with large effects sizes (AAQ-W: \( t (58.40) = 3.02, p = 0.004, es = 1.05 \), WHOQOL: \( t (59.31) = -2.37, p = 0.021, es = 0.88 \), BSQ: \( t (58.65) = 2.09, p = 0.041, es = 0.77 \)). Regarding eating disordered behaviors and attitudes measured with EDE-Q total, those undergoing ACT exhibited large and significant improvements in both the post-treatment and follow-up assessments, whereas those undergoing TAU did not improve significantly after treatment, but exhibited a medium and significant improvement from before treatment to follow-up. Therefore, the comparison between conditions between pre-treatment to follow-up changes was not significant (EDE-Q: \( p = 0.40, es = 0.3 \)). See appendix for a presentation of results from the MMRM analysis dismantling significant time by treatment interactions.
Table 3
Results of the MMRM analysis displaying Group (ACT and TAU) time (pre, post and follow-up and interaction effect)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group effect F(1,df2)</th>
<th>Time effect F(2,df2)</th>
<th>Group x time effect F(2,df2)</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOQOL</td>
<td>2.76(36.7) .11</td>
<td>7.94(58.8) .001**</td>
<td>5.37(58.8) .007**</td>
<td>.74*</td>
</tr>
<tr>
<td>EDE-Q tot</td>
<td>3.06(36.1) .089</td>
<td>11.20(58.1) &lt;.001**</td>
<td>2.84(58.1) .067*</td>
<td>.54*</td>
</tr>
<tr>
<td>Shape</td>
<td>2.17(36.4) .15</td>
<td>12.47(58.5) .001**</td>
<td>4.51(58.5) .015**</td>
<td>.68*</td>
</tr>
<tr>
<td>Weight</td>
<td>4.10(35.7) .05**</td>
<td>14.87(58.3) &lt;.001**</td>
<td>3.59(58.3) .034**</td>
<td>.61*</td>
</tr>
<tr>
<td>Restraint</td>
<td>4.30(32.2) .046**</td>
<td>.95(56.8) .39</td>
<td>.26(56.8) .77</td>
<td>.16</td>
</tr>
<tr>
<td>Eating</td>
<td>1.03(36.0) .32</td>
<td>5.00(58.7) .01**</td>
<td>.69(58.7) .51</td>
<td>.26</td>
</tr>
<tr>
<td>SBEQ</td>
<td>2.32(37.1) .14</td>
<td>.49(65.4) .62</td>
<td>1.26(65.4) .29</td>
<td>.36</td>
</tr>
<tr>
<td>BSQ</td>
<td>4.30(36.3) .045**</td>
<td>8.29(58.2) .001**</td>
<td>3.98(58.2) .024**</td>
<td>.64*</td>
</tr>
<tr>
<td>AAQ-W</td>
<td>1.92(35.9) .18</td>
<td>6.33(58.1) .003**</td>
<td>4.67(58.1) .013**</td>
<td>.69*</td>
</tr>
<tr>
<td>Bull’s eye</td>
<td>.98(26.6) .33</td>
<td>4.13(46.0) .022**</td>
<td>10.68(46.0) &lt;.001**</td>
<td>1.21**</td>
</tr>
<tr>
<td>Relation</td>
<td>Work</td>
<td>.14(28.9) .71</td>
<td>3.83(48.6) .029**</td>
<td>1.18**</td>
</tr>
<tr>
<td></td>
<td>Leisure</td>
<td>1.79(28.3) .19</td>
<td>1.59(50.8) .21</td>
<td>.83**</td>
</tr>
<tr>
<td></td>
<td>Growth/health</td>
<td>2.02(28.8) .89</td>
<td>4.08(49.3) .023**</td>
<td>.67*</td>
</tr>
</tbody>
</table>

Note: Significant p<.05 * Marginally significant p = < .10 > .05. Effect size * = medium >.50, ** = large > .80. F(1,df2) and F(2,df2) = F-values with 1 or 2 degrees of freedom in numerator, (df2) = degrees of freedom in denominator, p = significance level, effect size = Cohen's d. EDE-Q = Eating Disorder Examination Questionnaire, Shape = subscale in EDE-Q, Weight = subscale in EEQ Restraint sub-scale = the EDE-Q Eating = subscale in EDE-Q, SBEQ = Subjective Binge Eating Questionnaire for Bariatric Surgery patient, BSQ = Body Shape Questionnaire, WHOQOL-BREF = World Health Organization Quality of Life - BREF, AAQ-W = Acceptance and Action Questionnaire for Weight.

The normal theory coefficients, for the a, b, c and c`paths for the meditational role of psychological flexibility measured with AAQ-W for each of the three primary outcomes at follow-up are shown in figure 3. The boot strap tests the difference between the paths from treatment to outcome (the c paths indicated by the horizontal arrows) and that relationship after accounting for the mediator (c`paths, indicated by the arched arrows at the top).
Figure 3. Unstandardized bootstrapped coefficients and their standard errors.

As indicated by the cross-product test, psychological flexibility measured with AAQ-W significantly mediated quality of life measured with WHOQOL (point estimate = 3.32, SE = 2.32, 95% CI: 0.05, 10.61) and body dissatisfaction measured with BSQ (point estimate = -8.16, SE = 4.00, 95% CI: -22.75, -2.67), and was a marginally significant (p = 0.06) mediator of disordered eating attitudes and behaviours measured with EDE-Q total (point estimate = -0.35, SE = 0.22, 95% CI: -0.84, -0.003). For quality of life measured with WHOQOL, a significant direct effect of condition (t (29) = 2.17, p = .04) became non-significant (t (29) = .97, p = .34) when controlling for the mediator measured with AAQ-W. For body dissatisfaction measured with BSQ, a significant direct effect of condition (t (29) = -2.33, p = .03) became non-significant (t (29) = -.75, p = .46) when controlling for the mediator measured with AAQ-W. For disordered eating attitudes and behaviours measured with EDE-Q total, a marginally significant direct effect of condition (t (29) = -1.93, p = .07) became non-significant (t (29) = -.78, p = .45) when controlling for the mediator measured with AAQ-W. Post level of the three outcomes (WHOQOL, EDE-Q total and BSQ) were entered into a multiple mediator model, adjusting for baseline levels of these outcomes, BMI,
and of psychological flexibility measured with AAQ-W, to see if they successfully mediated (at least at a marginally significant level, $p < .10$) follow-up psychological flexibility. None of the individual outcomes were significant mediators, but all outcomes combined did do so (point estimate = -12.41, $SE = 7.13$, 95% CI: -27.43, -3.12, $p < .05$).

**Discussion**

The results showed that treatment gains were maintained at the 6-month follow-up. ACT led to large gains in quality of life and body dissatisfaction as compared with TAU. Both groups improved in the core pathology of eating disorders. The strengths of Study II, include a well-defined and testable underlying theory, as well evaluation of underlying mechanisms of change. As predicted by the underlying model, weight-related psychological flexibility mediated the impact on quality of life, body dissatisfaction, and disordered eating at follow-up. This finding indicates that an ACT intervention in a bariatric surgery setting works as predicted, through an enhanced ability to continue with valued activities when confronted with negative emotions and thoughts. This has implications for how to design effective treatment interventions post bariatric surgery. An emphasis on psychological flexibility may be a key to behavioral change. However the results are preliminary. Since the three outcome variables combined mediated psychological flexibility, there is some mutuality between psychological flexibility and outcomes. The mediational role of psychological flexibility will not be certain until these results are confirmed with psychological flexibility being measured before significant outcome changes occur.

Limitations of Study II, include no objective data, such as weight loss or weight loss maintenance. Participants in this sample had already lost significant weight or were in a phase of losing weight during the course of the study (mean BMI 27). The timing of the treatment in this sample (4 to 38 months) is too broad for follow-up analysis of weight. Another limitation is that, although intent-to-treat analysis was used, a fair amount of data was missing at follow-up (74% completed assessments). Drop out from treatment and missing post-treatment data are quite common in self-help and web-based treatments. A review reported a dropout rate ranging from 2% to 83%, with an average of 31% (Melville, Casey, & Kavanagh, 2010).

Although limitations, results are promising. Replication of these findings in larger scale studies would help ascertain the generalizability of the results.
Study III: Measuring experiential avoidance in bariatric surgery patients - psychometric properties of the AAQ-W

Introduction

Attempts to alter experiences associated with one’s body and eating might cause disruptions in life and adjustment after surgery, and impair the ability to change behavioral patterns and develop balance in important life domains (Guerdjikova et al., 2007; Kinzl, Traweger, Trefalt, & Biebl, 2003; White, Kalarchian, Masheb, Marcus, & Grilo, 2010). One possible common underlying process observed in emotional eating and avoidance of one’s body is experiential avoidance: any attempt to avoid, change, or control unwanted thoughts and feelings when doing so causes harm (Hayes, Strosahl, & Wilson, 2011). A growing body of research suggests that experiential avoidance may be central in the development of a broad range of other mental and physical health problems (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Ruiz, 2010). Valid measures capturing underlying psychological processes after surgery for obesity are needed to help identify important clinical targets and develop psychosocial interventions in conjunction with surgery. Study III evaluates the psychometric properties of an experiential avoidance measure, the Acceptance and Action Questionnaire for Weight (AAQ-W).

Aim

The purpose of this study was to conduct a psychometric evaluation of the AAQ-W in a clinical bariatric surgery setting.

Method

Study III consists of three samples. For each sample, a series of questionnaires was administered to the participants during routine follow-up care. Participants in sample 1 (factor analysis and validation) were investigated during a 6-month follow-up after surgery. A total of 178 of the 310 eligible participants who were invited to participate actually completed the measures. Sample 2 (predictive validity) was comprised of 61 participants from sample 1 who completed the measures again at a 1-year post-surgical follow-up. Sample 3 (test-retest and validation) consisted of a separate set of participants who had undergone surgery a minimum 8 months and maximum 2 years prior. Of the 234 who were invited, 75 participated. An average of 365 days (range 243-603 days) had passed since surgery at the time of the study. Thirteen participants in sample 2 did not complete the second assessment used for the test re-test reliability analysis. The majority of participants were
female, middle aged, married, employed, and were no longer obese, but overweight.

Measurements
The AAQ-W, BSQ, and EDE-Q forms are described in study I. Based on the current samples internal consistency (Cronbach α) for each measurement was calculated; BSQ α = .94, EDE-Q total α = .91, restrain α = .66, shape α = .65, eating α = .78, weight α = .65. Acceptance and Action Questionnaire II (AAQ-II) is a 10-item questionnaire that measures general levels of experiential avoidance. Higher scores indicate more experiential avoidance. The AAQ-II demonstrates good psychometric properties, including test-retest reliability, internal consistency, and validity (S. C. Hayes et al., 2004). In the current study sample Cronbach α = .55 for AAQ-II. The Emotional Overeating Questionnaire (EOQ) measures the frequency of overeating in response to emotion. Higher scores represent more frequent overeating in response to emotion. The EOQ is internally consistent and has shown good validity in a group of treatment-seeking overweight adults with binge eating disorder (Masheb & Grilo, 2006). In the current study sample Cronbach α = .77 for EOQ. The Satisfaction with Life Scale (SWLS) is a widely used 5-item questionnaire that measures subjective quality of life with good psychometric properties (Diener & Pavot, 1993). Higher scores represent more satisfaction with life. In the current study sample Cronbach α = .93 for SWLS. The Depression Anxiety Stress Scale 21 (DASS-21) measures three related negative emotional states: depression, anxiety, and stress. The DASS-21 is the short form of the 42 item self-report measure (Henry & Crawford, 2005). Higher scores represent higher levels of depression, anxiety, and stress. A psychometric evaluation of the DASS-21 in a large non-clinical sample (n=1794) showed good reliability (Henry & Crawford, 2005). In the current study sample Cronbach α = .90 for DASS.

Statistical analysis
Pearson correlation was used to assess convergence among the measures. A weak correlation was considered .1-.3, a moderate correlation .3-.5, and a strong correlation >.5. The predictive validity of psychological flexibility was evaluated by using simple regression analysis between six month assessment after surgery of AAQ-W and then a follow-up assessment at one year after surgery of DASS, SWLS, EDE-Q and EOQ. Reliability was estimated using the intraclass correlation coefficient (ICC2) present in the Shrout and Fleiss nomenclature. This method was used with the purpose of
handling systematic errors between time points. The results of the ICC can be interpreted according to Landis and Koch (1977), where <0 indicates no agreement, 0.0-0.20 slight agreement, 0.21-0.40 fair agreement, 0.41-0.60 moderate agreement, 0.61-0.80 substantial agreement, and 0.81-1.00 almost perfect agreement. Internal consistency offers an estimated error associated with the particular selection of items. Internal consistency was measured using Cronbach’s alpha. High error and heterogeneous items mean low internal consistency. An alpha score >.70 is sufficient and a score >.80 is good. Factor analysis and principal component analysis was used to explore how responses on particular items cluster together to represent unique constructs. First, an analysis without rotation was performed. Using Cattell’s scree test, the correct number of components was derived. The selected components were then rotated with varimax rotation. Varimax rotation is an orthogonal rotation of the factor axes, which results in either large or small loadings. This rotation makes the interpretation easier for identifying each item with a construct/factor. A rule of thumb for factor loading is <.5. The last analysis was validation using Pearson correlation for the emerging constructs or subscales.

Results

Reliability and internal consistency
Regarding reliability, the AAQ-W at both test occasions had an ICC of 0.76 (95% CI 0.62 – 0.85). This represents a substantial degree of agreement between test occasions (Shrout & Fleiss, 1979). AAQ-W exhibited high internal consistency ($\alpha = .86$) and a satisfying inter-item correlation of .23.

Convergent and predictive validity
The AAQ-W correlated with general levels of experiential avoidance measured with AAQ-II ($r = .61$). The AAQ-W also showed moderate correlations in the expected direction, with negative emotional states measured with DASS ($r = .47$), satisfaction in life measured with SWLS ($r = -.52$), and emotional over eating measured with EOQ ($r = .51$), body dissatisfaction measured with BSQ ($r = .70$), and eating disordered behaviors and attitudes measured with EDE-Q total ($r = .72$). The AAQ-W showed moderate to strong correlations with the four EDE-Q subscales: restraint ($r = .36$), eating concerns ($r = .59$), weight concerns ($r = .63$), and shape concerns ($r = .71$). The AAQ-W showed a positive, but non-significant, correlation with BMI ($r = .12$). In addition, the results showed that the AAQ-W measured 6 months after surgery was a significant predictor at one year, of the negative emotional states measured with DASS ($F(1,59) = 2.1$, $R^2 = 0.17$, $p<.001$), satisfaction with life measured with SWLS ($F(1,59) = 20.95$, $R^2 = 0.26$, $p<.001$), eating disordered behaviors and attitudes measured with EDE-Q total ($F(1,58) = 67.57$, $R^2 = 0.54$, $p<.001$), and emotional eating measured with
EOQ ($F(1,58) = 17.16, R^2 = 0.23, p<.001$) measured 1 year after surgery. The AAQ-W was not a significant predictor of BMI ($F(1,59) = 1.99, R^2 = 0.03, p = 0.16$) or %EBMIL at one year ($F(1, 59) = 1.48, R^2 = -0.02, p = .51$).

**Principal component analysis**

An exploratory unrotated factor solution resulted in five factors with eigenvalues > 1, indicated by the scree test and Kaiser Criterion. These five factors together explained 55.49% of the variance. Factor one was labeled “food as control” ($M = 2.91, SD = 1.18$). The six items with the greatest loading on this factor were related to the use of food as a coping strategy for controlling emotions. The three items that loaded on the second factor, “body acceptance” ($M = 4.66, SD = 1.48$) related to body image concerns. Factor three was labeled “self-stigma” ($M = 1.96, SD = 1.09$) and contained five items related to the experience of internalized stigma. The fourth factor was comprised of three items related to the belief in one’s ability to take action and was labeled “self-efficacy” ($M = 2.94, SD = 1.13$). The fifth factor, “emotional avoidance”, contained three items ($M = 3.19, SD = 1.39$) related to the avoidance of feelings. See appendix for a presentation of factor loadings of each item in AAQ-W.

**Discussion**

The results of this study show that AAQ-W possesses satisfactory psychometric properties in a population of patients undergoing surgery for obesity. The AAQ-W shows good internal consistency, and the analysis of repeated measures suggests that the AAQ-W is a stable measure over time. Importantly, the results showed that the AAQ-W was predictive of poorer psychosocial and behavioral outcomes 6 months later, which provides preliminary support for the AAQ-W as a potential screening measure for poor adjustment after surgery. Five factors were found that can be used as subscales. This information may be useful in clinical practice for refinement of the general concept of experiential avoidance. This study has a number of limitations. The study was conducted with a limited sample of bariatric surgery patients. The time period of 6 months to 1 year in samples 1 and 2 may not be representative of a longer time span as the first few months after surgery is associated with dramatic weight loss. The naming of factors is subjective and names that better reflect the subscales could be found. For example, “food as control” could reflect the experience of losing control over eating and the experience of using food with the purpose of controlling negative feelings. Body acceptance could be associated with social situations and be named, for example, social impairment. However, names were drawn from a learning perspective and used ACT-consistent language. Thus, the AAQ-W
shows good psychometric properties and could be further evaluated in research and used in the clinical setting of bariatric surgery.

**Study IV: Screening for Disordered Eating following Obesity Surgery. Psychometric properties of the Disordered Eating in Bariatric Surgery (DEBS)**

**Introduction**
Assessing eating disordered behaviors in a reliable and valid way is a complicated task, which becomes even more complicated after bariatric surgery, as eating occurs in an entirely new context for the patient. Contextualization of post surgery circumstances in terms of the volume of the stomach and focus on key behaviors and emotions related to eating is crucial for reliable screening. There is some preliminary support for the hypothesis that pre-operative binge eating turn into other forms of disordered eating behaviors post surgery, such as frequent snacking and eating characterized by feeling of loss of control (de Zwann, 2010; Colles, 2008). There is a need for reliable and valid instruments measuring disordered eating behaviors post surgery.

**Aim**
The purpose of this study was to evaluate the psychometric properties of a questionnaire entitled Disordered Eating after Baratric Surgery (DEBS) among obesity surgery patients.

**Method**
Two study samples were used to meet the purpose of evaluating psychometric properties of DEBS. For each sample a series of questionnaires were used during the routine follow-up care. Participants in sample 1, the validation study, were investigated during a six-month follow-up post surgery. The majority of the approached patients (i.e., 178 of 234: 76%) agreed to participate. In the second sample, test-retest, a total of 67 out of 234 patients (29%) who were approached agreed to participate in the extra test-retest procedure of the DEBS. An average of 371 days (range= 239-607 days) had past since surgery before test-retest was administered. During an interval of 28 days two measures of test and re-test were taken in this first sample.
Measurements

Three measures were used. The EDE-Q and EOQ forms are described in study I and III. The Disordered Eating after Bariatric Surgery (DEBS) was designed by the author of this thesis and co-authors of the empirical article, to measure disordered eating such as binge eating, frequent snacking, experience of loss of control, feelings of shame and the incidence of vomiting associated with overeating in the context of bariatric surgery. The goal was to design a short questionnaire with high face validity, measuring the frequency of key behaviors and emotions that are formulated in such a way that helps the respondent to put the question in an adequate context (i.e., after bariatric surgery). In DEBS three kinds of behaviors are used for assessing overeating; "eating although the stomach is full", "snacking frequently” and "eating an excessive amount of food”. Disordered eating behaviors are accompanied by emotions and DEBS also measures "loss of control”, "shame” and "sneaking”. A last behavior associated with eating disordered behaviors is over-eating accompanied by vomiting A higher score on DEBS indicates a higher rate of disordered eating over the last 28 days. The highest possible score is 196 and the lowest 0. See table 4 for a presentation of the DEBS Questionnaire.

Statistical analyses

Distributions were examined with Shapiro-Wilk test. DEBS total score was not normally distributed, as well as the majority of the variables on an item level. Therefore correlations for construct validity was investigated by Spearman’s rho and reciprocal transformation, -1(x+1) was performed for factor analysis. Internal consistency was tested using Cronbach’s alpha. Reliability was examined using Pearson correlation and Intra Class Correlation Coefficient (ICC2). The factor structure of the DEBS was investigated using principal component analysis.

Results

Item Descriptive Analysis
Across all items, means ranged from 0.45-3.33 (SD = 6.04-1.91), median 0 (range = 0-28). The corrected item-total correlation showed, that all items, except item 6, correlate fairly well with the sum of the reaming items that constitute the DEBS; item 1, r= .72, item 2 r = .51 item 3 r = .58, item 4 r =.69, item 5 r = .66, item 6 r = .12, item 7 r=. 56. This may be seen as evidence that item 6 is not measuring the same construct that is measured by the other items in the scale.
**Principal component analysis**

Parallel analysis based on both principal components and common factor analysis suggested a one-factor solution. The KMO value was .82, indicating factorability of the DEBS items. Principal component analysis with one factor extracted explained 49.68% of the variance, with an eigen-value of 3.48. One item, items 6, did not load on the factor. Please see table 4 for an overview of communalities and factor loadings.

**Table 4. DEBS, communalities and factor loadings**

<table>
<thead>
<tr>
<th>DEBS items</th>
<th>Communalities</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>In how many of the last 28 days, have you.../Under hur många av de senaste 28 dagarna har du...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. been eating even though you have felt that your stomach is full/ätit trots att du har känt att magsäcken är full</td>
<td>.68</td>
<td>.83</td>
</tr>
<tr>
<td>2. been snacking frequently throughout the day, apart from the food that its recommended to eat per day/småätit kontinuerligt under dagen, utanför den mängd mat som det är rekommenderat att äta per dag</td>
<td>.42</td>
<td>.65</td>
</tr>
<tr>
<td>3. been eating an excessive amount of food in a relatively short time in relation to what is normal for you with regard to the gastric volume after the surgical procedure/ätit en för stor mängd mat på relativt kort tid i relation till vad som är normalt för dig med hänsyn till magsäckens volym efter operation</td>
<td>.45</td>
<td>.68</td>
</tr>
<tr>
<td>4. In how many of these cases above (i.e., when you have eaten, although the stomach was full, snacking frequently or eating an excessive amount of food) have you felt that you have lost control over your eating/?Under hur många av dessa tillfällen ovan (dvs. Då du har ätit trots att magsäcken har varit full, småätit, eller ätit en för stor mängd mat) har du känt att du har förlorat kontroll över ditt ätande?</td>
<td>.72</td>
<td>.84</td>
</tr>
<tr>
<td>5. In how many of these cases above (i.e., when you have eaten, although the stomach was full, snacking frequently, or eating an excessive amount of food) have you experienced shame associated with your eating/?Under hur många av dessa tillfällen (dvs. då du har ätit trots att magsäcken har varit full, småätit, eller ätit en för stor mängd mat) har du upplevt skam kopplat till ditt ätande?</td>
<td>.67</td>
<td>.81</td>
</tr>
<tr>
<td>6. In how many of these cases above (i.e, when you have eaten, although the stomach was full, snacking frequently or eating an excessive amount of food) have you vomited./Under hur många av dessa tillfällen (dvs. då du har ätit trots att magsäcken har varit full, småätit, eller ätit en för stor mängd mat) har du kräkt?</td>
<td>.67</td>
<td>.14</td>
</tr>
<tr>
<td>7. In how many of these cases above (i.e, when you have eaten, although the stomach was full, snacking frequently, or eating an excessive amount of food) have you eaten in secret/?Under hur många av dessa tillfällen (dvs. då du har ätit trots att magsäcken har varit full, småätit, eller ätit en för stor mängd mat) har du ätit i smyg?</td>
<td>.53</td>
<td>.72</td>
</tr>
</tbody>
</table>

**Reliability and internal consistency**

The DEBS at both test occasions showed an ICC = .83 95 % CI (.73-.89) and Pearson correlation r = .83. This represents a very high degree of agreement between test occasions. The DEBS showed a high internal consistency, Cronbachs alpha α.73.
Convergent validity

Regarding convergent validity, DEBS's total score correlated significantly with eating disordered behaviors and attitudes measured with the EDE-Q's total score ($r_s = .52$), as well as sub-scales of the EDE-Q ($r_s = .39$ to $.59$). The total DEBS score correlated significantly with symptoms of binge eating ($r_s = .48$ to $.52$) measured with the EDE-Q items 13, 14 and 15. DEBS's total scale correlated significantly with emotional over eating, measured with the EOQ total scale ($r_s = .83$).

With the purpose of further examining the relevance of each individual item, each item was correlated with the EDE-Q. All DEBS items correlated with the EDE-Q total score ($r_s = .42$ to $.43$) except item six (measuring occurrence of vomiting). Item six correlated neither with any of the EDE-Q's sub-scales, the occurrence of binge eating, nor the total score of the EDE-Q. All DEBS items correlated with EOQ total scale ($r_s = .30$ to $.67$), except item six. Item inter-correlations showed that all items were significantly and weakly to moderately ($r = .28$ to $.68$) correlated except item six, which was not correlated with the other items. A PCA without item 6 resulted in a one factor solution, explaining $57.71\%$ of the variance.

DEBS-6

The psychometric properties of DEBS as a six item-version (with item 6 excluded), called DEBS-6 was evaluated next. The total score on the DEBS-6 showed an $ICC=.82$, $95\% CI (.73-.89)$ which represents a high degree of agreement between test occasions. The DEBS-6 also showed a high internal consistency, Cronbachs alpha $\alpha = .83$. Spearman $r_s$ was used for correlation with EDE-Q and EOQ. DEBS-6 correlated significantly with EDE-Q total scale, $r_s = .52$ and sub scales, $r_s = .39$-. .62 and item 13-15, $r_s = .42$-. 44. DEBS-6 also correlated significantly with EOQ, $r_s = .84$.

Differences between GBP and sleeve

The mean value on DEBS for participants undergoing the gastric by pass procedure (GBP) was 13.69 ($SD = 18.94$) and median 5.5 and range 0-86 and for participants undergoing sleeve gastrectomy (SG) the mean value was 8.46 ($SD = 14.52$) and median 3.5 and range 0-98. A Mann-Whitney U Test showed a marginally significant difference between the two surgical procedures, $z = 1.65$, $p = 0.08$.

In further analysis of the convergent validity in each group, no differences were found. DEBS total score correlated well with established measures (EDE-Q and EOQ) in both groups; EDE-Q total GBP $r_s = 0.62$ ($p = <.000$) and SG $r_s = 0.47$ ($p = <.000$) and EOQ total $r_s = .83$, ($p = <.000$). Cronbachs alpha in the GBP group was $\alpha = 0.84$ and in the SG group, $\alpha = 0.80$. 

67
Discussion

Results indicate that the DEBS possesses good test-retest reliability and correlates well with established instruments for general eating disorder problems, binge eating and emotional eating. Twenty one persons reported vomiting in DEBS, but only one of them reported vomiting for weight and shape reasons in EDE-Q. Item 6 seems to captures a mix of potentially compensatory and non-compensatory vomiting, making it difficult to ascertain to what extent the reported frequency is representing disordered eating.

Results from corrected item total correlations and principal component analysis showed that item six needs to be explored further. The non-existing correlations could be explained by vomiting behavior, being a side effect, produced by the surgical procedure per se and not being a part of an eating disorder. For example plugging is when food is getting stuck in the mall opening in the stomach, and can result in vomiting (de Zwann et al., 2010). There are a number of limitations in the current study. The time period of six months, when assessments were taken, might not be representative for a longer time span following surgery. The sample was predominantly female. Therefore it should be noticed that results might not be generalizable to men in this population.

The DEBS could be further examined in larger samples with different time points after surgery. Future studies should also investigate differences between surgical procedures, using controlled designs. The DEBS may be clinically useful in the postoperative follow up care. It contains relatively few items and is simple to administer. Practitioners might benefit from using DEBS in the follow-up care and when design treatment interventions for sub-group of patients.
General discussion

Obesity is recognized as an epidemic and includes a host of potentially deadly and debilitating health conditions which makes it essential to find long-term solutions (Berrington de Gonzalez et al., 2010). Behavioral weight loss treatments have failed to achieve this goal, as in a majority of cases, there is evidence to suggest that initial success is followed by weight regain (Anderson, et al., 2001; Mann et al., 2007; Wadden, Butryn, & Byrne, 2004). Bariatric surgery is associated with weight loss, long-term maintenance of the weight loss, and improvements in co-morbid medical conditions (Karlsson, et al., 2007; Maggard et al., 2005). However, some patients who have undergone bariatric surgery report a loss of control over eating and distress concerning body shape, which seem to effect other outcomes including weight loss and quality of life (Guerdjikova et al., 2007; Kinzl, Traweger, Trefalt, & Biebl, 2003; White, Kalarchian, Masheb, Marcus, & Grilo, 2010). Evidence indicates that experiential avoidance is a key process in obesity-related problems (Ghaderi, 2003; Kingston, Clarke, & Remington, 2010; Lillis et al., 2009). In Acceptance and Commitment Therapy (ACT), experiential avoidance refers avoidance unpleasant internal experiences even in cases where it causes harm (Hayes, et al., 2006). The author of this thesis hypothesized that experiential avoidance might play a role in problematic behavior patterns observed following bariatric surgery.

The present thesis used a conceptualization drawn from ACT to develop and evaluate a treatment method that could become accessible to a greater number of bariatric surgery patients. Two studies were conducted to evaluate an ACT intervention and a further two other studies tested the psychometric properties of two measures for assessing the postoperative status of patients.

Treatment Evaluation

Effectiveness

The main aim of this thesis was to evaluate the immediate and 6-month postsurgical effects of an ACT intervention for bariatric surgery patients. Previous research and clinical experience guided the development of a treatment protocol based on ACT principles and exercises adjusted for post-surgical experiences. An additional aim was to develop and evaluate an intervention
that would be accessible to a larger number of persons, irrespective of their geographical location. The treatment was therefore implemented via the Internet.

In study I, the initial results revealed large and significant effects in the ACT group compared to TAU in terms of eating disorder behaviors, body dissatisfaction, quality of life, and psychological flexibility. In a second follow-up at 6 months (study II) the maintenance of behavioral changes was examined. Participants undergoing ACT maintained significant improvements in quality of life, body dissatisfaction, and psychological flexibility.

Effect sizes complement inferential statistics, since they measure the strength of differences between treatments, or the magnitude of a treatment effect. In terms of effect sizes, the differences between ACT and TAU were large immediately after treatment and in favor for ACT. At the 6-month follow-up effect sizes were medium, which might be due to improvements over time with TAU, rather than deterioration after ACT. Both the ACT and the TAU groups had improved significantly at the 6-month follow-up with regard to eating disorder behaviors. ACT and TAU may work in different ways to produce changes in eating patterns. TAU included more topographically defined interventions, such as standard dietary advice. It is likely that these post-treatment interventions had an impact in the TAU group, particularly in the more overt areas, such as eating disorder behaviors. It should also be noted that participants in the ACT condition meet with the bariatric surgery team before surgery, as well as in the regular follow-ups required after surgery (six months, one year, two and three years post surgery). Participants in both the ACT and the TAU groups are expected to have knowledge about diets and recommendations-

An advantage of ACT compared to TAU was observed in the areas of body dissatisfaction and quality of life. ACT focused on developing more openness and flexibility regarding feelings that were previously avoided. In this study, participants reported an average of 20 years of failed weight loss attempts prior to surgery. A long history of dieting and the cycle of losing and re-gaining weight have been found to be connected to feelings of self-criticism, shame, and guilt (Annis et al., 2004) backed by a history of overt stigmatization and discrimination (Puhl & Heuer, 2009). ACT aims to establish a flexible non-judgmental attitude towards the body and weight in order to help the individual engage in vital activities. This process may have been involved in the significant improvements observed in quality of life and body dissatisfaction in the group that received ACT compared to those who underwent TAU. A hypothesis is that body dissatisfaction might not only be important for quality of life, but also for the maintenance of healthy behaviors. In behavioral therapy for obesity, initial changes in body dissatisfaction predict successful weight loss during the follow-up (Palmeira et al., 2010; Teixeira et al., 2010).
The present trial was partly delivered via the Internet. Web-based interventions promoting healthy behaviors have been examined in a meta-analysis and had, on average, a small but significant effect on behaviors compared to control conditions. Interventions grounded in a well-defined theory were associated with increased effect sizes. In addition, interventions with some therapist contact had larger effect sizes (Webb, Joseph, Yardley, & Michie, 2010). The present ACT intervention had large and medium effect sizes and included therapist contact.

In the context of obesity, weight loss is of interest. In the present thesis, weight loss was not a treatment outcome as the majority of participants had already lost weight through bariatric surgery and the timing of the psychological treatment is too broad for an analysis on weight loss. The focus was on obesity related problems other than weight, such as body dissatisfaction and quality of life.

The results are in line with studies that evaluated ACT for persons with obesity, in terms of its effects on quality of life, disordered eating behaviors and stigma experiences (Forman et al., 2009; Lillis et al., 2009; Tapper et al., 2009). There have been two previous RCTs on behavioral treatment in bariatric surgery setting. One examined CBT implemented preoperatively and found no differences in eating behaviors or weight loss at the one year follow-up, between those receiving CBT and controls (Lier et al., 2011). Lier et al.’s study differs from the present thesis in both the timing of the intervention in relation to surgery as well as the form of the intervention. ACT is a third wave CBT intervention. However, there are some differences between ACT and CBT in the area of obesity. CBT interventions are typically more educational and contain specific instructions regarding diet and exercise. ACT places great focus on increasing quality of life by, enhancing behavioral psychological flexibility. The second RCT evaluated a behavioral intervention implemented six years post surgery for participants with a BMI of over 30. There was a trend toward greater excess weight loss in the intervention group compared to the waiting list controls (Kalarchian, et al., 2012). Both the form and the timing of the intervention differ from the present thesis, which included participants in a relatively early post surgery phase. Participants reported obesity related complaints, but had not developed more serious problems such as gaining larger amounts of weight. Based on the present results the ACT can be used as a treatment strategy in the early phase post surgery, for patients with self-stigmatizing obesity related problems.

Although preliminary, the results are promising and may indicate means of designing psychological treatment following bariatric surgery that could be further evaluated in larger samples and other surgical surgery settings.
Mediational Effect

Differences between ACT and TAU seem to be due to the effect of ACT. This conclusion is supported by the treatment design, changes in psychological flexibility after treatment, and mediational analysis. The results suggest that enhancing psychological flexibility may have been a functionally important pathway toward good outcomes, which is in line with other studies evaluating ACT in behavioral medicine.

Treatment Acceptability

Therapy can be conducted in many different ways. When developing a new treatment method and implementing it with modern technologies, information on the degree to which patients accept it is valuable. Treatment acceptability, often called social validity, refers to the patient satisfaction with and acceptability of treatment procedures (Foster & Mash, 1999). The American Psychological Association guidelines state that the ability and willingness of patients to accept the treatment should be evaluated (American Psychological Association, 1995). All participants who completed treatment in the ACT group (n = 15) responded in the affirmative to the question “Would you recommend this treatment to someone else?” In addition to statistical significance, the experienced meaningfulness of the ACT intervention strengthens its clinical utility. Another indication of treatment acceptability is the time spent using the material on the Internet. The mean estimated time spent each week on the web module for ACT was 107 minutes, which seems to be a fair amount and could be interpreted to mean that participants were able and willing to use the Internet. There are limitations concerning the evaluation of treatment acceptability. Evaluation was made after treatment, when behaviors had already changed. Therefore, it is impossible to determine whether the nature or the efficacy of the treatment influenced the participants’ ratings. In addition, treatment acceptability can be evaluated in different ways. Other aspects related to meaningfulness are tolerability, appropriateness, reasonableness, and whether the treatment causes discomfort. These variables were not assessed in the present evaluation.

Instruments evaluated in the context of bariatric surgery

The AAQ-W is designed to measure weight-related experiential avoidance. It has satisfactory psychometric properties regarding stability over time, internal consistency, as well as concurrent and predictive validity. These results support the use of the AAQ-W in a bariatric surgery setting. The five factors food as control, body acceptance, self-stigma, self-efficacy, and emotional avoidance can provide a more detailed description of functional
behavioral patterns. For example, emotional eating correlates highest with food as control, a person struggling with this aspect might additional help with emotional eating. Although limitations exist, the results are promising and clinicians can use the AAQ-W with confidence.

To date, no specific instruments have been developed and evaluated for assessing disordered eating after bariatric surgery. The EDE-Q was developed for patients with eating disorders and researchers should consider how to improve and adjust the measure for bariatric surgery conditions (Hrabosky, 2008). Since eating behavior is forced to change after surgery, we must find new ways of identifying and measuring forms of disordered eating among these patients. In order to ensure that such behaviors do not remain undetected. The DEBS is designed for the specific conditions following bariatric surgery. Study IV revealed that the DEBS possesses good test-re test reliability and correlates well with established instruments for general eating disorder problems, binge eating and emotional eating. Principal component analysis revealed a one factor solution.

Contributions
The present thesis makes several contributions. First, as there is a lack of randomized controlled trials following bariatric surgery (Lier, Biringer, Stubhaug, & Tangen, 2011; Kalarchian et al., 2011) the present thesis contributes to the research field. The internal validity is strengthened by a RCT design, since the randomization minimizes allocation bias (Clark-Carter, 2004). Nevertheless, more RCTs are needed in the field of behavioral interventions following bariatric surgery.

A second contribution is that the treatment intervention was highly standardized and can be easily replicated in future studies. A third is that the thesis integrates a medical and a psychological treatment method for obesity. Since previous behavioral methods have failed in the treatment of obesity, and surgery alone does not appear to solve all psychological issues, a combination of both may be fruitful. The feasibility of implementing ACT in a bariatric outpatient clinic has been demonstrated. As this method of treatment was fairly new in the obesity setting, participants’ experiences of it become important. The acceptability of psychological treatment in the clinical setting seems to be good.

A fourth contribution is that the ACT intervention was implemented before the end of the “bariatric surgery honeymoon” phase for most participants. Therefore, it can possibly be viewed as a preventative intervention to avoid future more severe problems with gaining larger amounts of weight. A fifth contribution of the this thesis is that it presents a theoretically coherent intervention in addition to an evaluation of the mechanisms of change. The results can be used to design effective treatments that directly target postsurgery psychological flexibility. A sixth contribution is the delivery format
via the Internet, making behavioral treatment easily accessible to a larger number of people.

The final contribution is the evaluation of measures relevant to post bariatric surgery. Due to their psychometric properties, the AAQ-W and DEBS instruments can be used with confidence by clinicians, when, conceptualizing the client’s problems. In addition they will be useful to researcher for evaluating the long-term predictive ability of experiential avoidance and eating disordered behaviors in the longer run on quality of life weight loss, post surgery. Although the thesis has strengths, there are also some limitations.

Limitations

The present thesis has several limitations. First, the intervention study sample was small and the results must be considered as preliminary in nature. A small number of participants leads to a risk that one individuals change may affect the mean change. Second, the thesis is based on a single sample recruited from one clinical bariatric surgery setting. External validity refers to the degree to which the results of a study can be generalized to other contexts and individuals (Clark-Carter, 2004). The participants were recruited form a private clinic and there may be differences between private and county council clinics. Regarding weight status before surgery, the BMI in Study III and IV was 36.3 (SD = 3.5) and in study I 37.1 (SD = 3.2), which should be compared with a mean BMI of 42.6 (SD = 5.54) reported from county council clinics (Scandinavian Obesity Surgery Register, 2011). However, it is not clear whether these differences in BMI effect the generalizability of the present results. Although psychological suffering increases with BMI, it may be more strongly associated with perceived rather than actual overweight (Annis, Cash, & Hrabosky, 2004; Hill, 2005). Irrespective of BMI, obesity (BMI 30) is associated with psychological suffering and differences in this respect between a BMI of 37 and 42 should not be very great (Annis, Cash, & Hrabosky, 2004; Hill, 2005; Petry, et al., 2008; Puhl & Heuer, 2009). Concerning the clinical setting, there may be differences in the post operative care provided by private surgery clinics and clinics run by the county councils. Private clinics seem to provide more comprehensive care with regular access to nutritionists, nurses, doctors and psychologists (Lestner, Stal Berg, Sundberg, Håkansson & Seaman, 2010). The majority of participants in the present thesis were women. In view of the fact that women make up 75% of the bariatric surgery population in Sweden (Lestner et al., 2010), men are underrepresented in the present thesis. The sample in the intervention study is described as follows: treatment-seeking individuals in a private clinical setting, predominantly female, with an average of 23 years of obesity, 20 years of failed weight loss attempts prior to surgery, presenting with concerns in relation to food and body shape and a mean BMI of 27 post
surgery. Future research should replicate the study results in different settings with other participants to validate the findings.

Third, no diagnostic assessment was performed, which makes generalization more difficult. To date, the research field has no golden standards or guidelines for assessing psychological functioning following bariatric surgery. Researchers have only recently started to define postoperative psychological issues. As the present thesis contains a new intervention method, an explorative approach was deemed appropriate. An explorative approach was used in this thesis, since it is one of the first attempts in this field. However, future studies might benefit from stricter inclusion and exclusion criteria, as patient characteristics may facilitate generalization of the results.

Fourth, there were dropouts in the intervention and psychometric studies. In intervention studies a concern is that dropout could be related to the response to treatment. For example, a hypothesis could be that participants, who dropped out did not benefit from the treatment. In the ACT group three participants dropped out before the start of intervention, one failed to complete post questionnaires and three did not complete follow-up questionnaires. The author of the thesis made telephone contact with all those who had not responded, to ask them how they were, and all confirmed that they were doing well. The reason for not completing the questionnaires was mainly lack of time due to leisure activities, travels and social gatherings. The fact that there were no differences between dropouts and followers in terms of pre-variables or demographic data, makes the conclusions a bit more valid. However, it is a limitation with dropouts when it comes to drawing conclusions.

Fifth, it is important to note that individuals who reported interest in participating, may differ from the rest of the population. The participants in treatment studies I and II reported more problems than those in the regular follow-up studies III and IV. There are probably sub-groups of bariatric surgery patients, and researcher should exercise caution when drawing conclusions about the general population of bariatric surgery patients. While some patients report disordered eating concerns and body dissatisfaction, most do well post surgery (Kolotkin et al., 2012).

Sixth, the follow-up period was six months and, participants receiving TAU also took part in the ACT intervention after that time point, which means that a longer follow-up after the ACT intervention was not possible. Seventh, the TAU condition was not well controlled. TAU was an active treatment provided by a specialized post-surgical team. How frequently the participants in this group contacted the multidisciplinary team is not known; therefore, the TAU treatment is not well defined.

Finally, the meditation analysis has shortcomings. As changes had already occurred at the post-treatment assessment, changes in psychological flexibility did not necessarily precede changes in outcome variables. In order to be determinative, mediators should be measured before the outcomes
change occur. In order to capture the moment of change from experiential avoidance to psychological flexibility, future studies should use repeated measures to model the time it required for individuals to exhibit mediator variable change. Although there are strategies for capturing the moment of change, the changes in mediator and outcomes can still occur at about the same time. Research on mediation is relatively novel in the field of psychological treatment. Another shortcoming is that combined outcome variables mediated psychological flexibility, which suggests some mutuality between the mediator and outcomes. Reduction in the outcomes contributed to reduction in the mediator. However, none of the individual outcomes were significant mediators. In addition, the effects of the intervention on outcome became non-significant when controlling for the mediator. Thus, the mediator significantly accounted for the changes in outcome variables. However, the mediational role of psychological flexibility will not be certain until results are confirmed with the mediator of psychological flexibility by measuring the mediator before significant outcome changes occur.

Future considerations

Practitioners working with bariatric surgery patients have questions, such as “For whom, under what circumstances, and how should psychological treatment be implemented in clinical care after surgery?” Unfortunately, this is only the third study conducted after surgery, thus it is too soon to any such conclusions. However, the results are promising with regard to using ACT for patients seeking psychological support after surgery. Therapist support seems warranted until future studies have clarified questions on pertaining to participant selection.

Future studies should:

- Evaluate an ACT trial where the psychological intervention is implemented after the honeymoon phase, i.e. at least 2 years after surgery.
- Evaluate whether ACT remains effective with less therapist contact, or the Internet alone, without any therapist contact.
- Test ACT in subgroups of bariatric surgery patients.
- Compare ACT with other psychological interventions.

Today there is a lack of reliable and valid measures for post surgery conditions.

- AAQ-W and DEBS should be evaluated further in different settings and using larger samples.
Conclusions

The results of this thesis indicate the preliminary effectiveness of an ACT intervention comprising a brief period of six weeks in a bariatric surgery clinical setting. ACT proved effective compared to TAU in the areas of body dissatisfaction and quality of life. This finding suggests that ACT is promising and should be evaluated further as part of treatment after bariatric surgery. The AAQ-W and the DEBS instruments are two tools that seem to be clinically useful and can be employed by researchers to explore experiential avoidance and eating disordered behaviors in the bariatric surgery setting.
## APPENDIX

Results from the mixed model repeated measures analysis dismantling significant time by treatment interactions

<table>
<thead>
<tr>
<th>Measure</th>
<th>Point Estimate</th>
<th>SE</th>
<th>(df)</th>
<th>t</th>
<th>p</th>
<th>Ef-</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WHOQOL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre to post</td>
<td>8.68</td>
<td>1.85</td>
<td>(59.54)</td>
<td>4.67</td>
<td>&lt;.001**</td>
<td>1.20*</td>
</tr>
<tr>
<td>Pre to F-Up</td>
<td>6.99</td>
<td>2.02</td>
<td>(58.84)</td>
<td>3.46</td>
<td>.001**</td>
<td>.97*</td>
</tr>
<tr>
<td>Pre to post</td>
<td>.86</td>
<td>1.70</td>
<td>(58.47)</td>
<td>.50</td>
<td>.62</td>
<td>.12</td>
</tr>
<tr>
<td>Pre to F-up</td>
<td>.66</td>
<td>1.74</td>
<td>(58.59)</td>
<td>.38</td>
<td>.71</td>
<td>.09</td>
</tr>
<tr>
<td>Pre/Post ACT</td>
<td>-7.82</td>
<td>2.52</td>
<td>(59.05)</td>
<td>-3.10</td>
<td>.003**</td>
<td>1.08*</td>
</tr>
<tr>
<td>Pre/F-up</td>
<td>-6.33</td>
<td>2.67</td>
<td>(59.31)</td>
<td>-2.37</td>
<td>0.021</td>
<td>.88*</td>
</tr>
<tr>
<td><strong>EDE-Q total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre to post</td>
<td>-.92</td>
<td>.21</td>
<td>(58.92)</td>
<td>-4.45</td>
<td>&lt;.001**</td>
<td>1.13*</td>
</tr>
<tr>
<td>Pre to F-Up</td>
<td>-.70</td>
<td>.23</td>
<td>(59.23)</td>
<td>-3.12</td>
<td>.003**</td>
<td>.86**</td>
</tr>
<tr>
<td>Pre to post</td>
<td>-.26</td>
<td>.19</td>
<td>(57.81)</td>
<td>-1.35</td>
<td>.18</td>
<td>.32</td>
</tr>
<tr>
<td>Pre to F-up</td>
<td>-.45</td>
<td>.19</td>
<td>(57.94)</td>
<td>-2.34</td>
<td>.023**</td>
<td>.55*</td>
</tr>
<tr>
<td>Pre/Post ACT</td>
<td>.66</td>
<td>.28</td>
<td>(58.41)</td>
<td>2.37</td>
<td>.021**</td>
<td>81**</td>
</tr>
<tr>
<td>Pre/F-up</td>
<td>.25</td>
<td>.30</td>
<td>58.68)</td>
<td>.84</td>
<td>.40</td>
<td>.31</td>
</tr>
<tr>
<td><strong>Shape</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre to post</td>
<td>-1.33</td>
<td>.28</td>
<td>(59.25)</td>
<td>-4.82</td>
<td>&lt;.001**</td>
<td>1.23*</td>
</tr>
<tr>
<td>Pre to F-Up</td>
<td>-1.24</td>
<td>.30</td>
<td>(59.55)</td>
<td>-4.12</td>
<td>&lt;.001**</td>
<td>1.15*</td>
</tr>
<tr>
<td>Pre to post</td>
<td>-.22</td>
<td>.39</td>
<td>(58.17)</td>
<td>-1.87</td>
<td>.39</td>
<td>.20</td>
</tr>
<tr>
<td>Pre to F-up</td>
<td>-.51</td>
<td>.26</td>
<td>(58.29)</td>
<td>-1.96</td>
<td>.055*</td>
<td>.47</td>
</tr>
<tr>
<td>Pre/Post ACT</td>
<td>1.11</td>
<td>.37</td>
<td>(58.75)</td>
<td>2.96</td>
<td>.004**</td>
<td>1.03*</td>
</tr>
<tr>
<td>Pre/F-up</td>
<td>.73</td>
<td>.40</td>
<td>(59.01)</td>
<td>1.84</td>
<td>.071*</td>
<td>.68*</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre to post</td>
<td>-1.33</td>
<td>.27</td>
<td>(59.30)</td>
<td>-4.93</td>
<td>&lt;.001**</td>
<td>1.26*</td>
</tr>
<tr>
<td>Pre to F-Up</td>
<td>-1.18</td>
<td>.29</td>
<td>(59.77)</td>
<td>-4.00</td>
<td>&lt;.001**</td>
<td>1.11*</td>
</tr>
<tr>
<td>Pre to post</td>
<td>-.35</td>
<td>.25</td>
<td>(57.83)</td>
<td>.17</td>
<td>.33</td>
<td></td>
</tr>
<tr>
<td>Pre to F-up</td>
<td>-.67</td>
<td>.25</td>
<td>(58.01)</td>
<td>-2.63</td>
<td>.011**</td>
<td>.63*</td>
</tr>
<tr>
<td>Pre/Post ACT</td>
<td>.98</td>
<td>.37</td>
<td>(58.62)</td>
<td>2.68</td>
<td>.01**</td>
<td>93**</td>
</tr>
<tr>
<td>Pre/F-up</td>
<td>.51</td>
<td>.39</td>
<td>(59.02)</td>
<td>1.31</td>
<td>.20</td>
<td>.48</td>
</tr>
<tr>
<td><strong>BSQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre to post</td>
<td>Pre to F-Up</td>
<td>Pre to post</td>
<td>Pre to F-up</td>
<td>Pre/Post ACT</td>
<td>Pre/F-up</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-12.46</td>
<td>2.80</td>
<td>(58.86)</td>
<td>-4.45</td>
<td>&lt;.001**</td>
<td>1.14*</td>
</tr>
<tr>
<td></td>
<td>-9.95</td>
<td>3.05</td>
<td>(59.11)</td>
<td>-3.26</td>
<td>.002**</td>
<td>.91**</td>
</tr>
<tr>
<td></td>
<td>-2.37</td>
<td>2.57</td>
<td>(57.93)</td>
<td>.36</td>
<td>.36</td>
<td>.22</td>
</tr>
<tr>
<td></td>
<td>-1.55</td>
<td>2.63</td>
<td>(58.03)</td>
<td>.56</td>
<td>.56</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>10.09</td>
<td>3.80</td>
<td>(58.44)</td>
<td>2.65</td>
<td>.01**</td>
<td>.92**</td>
</tr>
<tr>
<td></td>
<td>8.40</td>
<td>4.03</td>
<td>(58.65)</td>
<td>2.09</td>
<td>041**</td>
<td>.77*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre/Post ACT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>--------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1.96</td>
<td>0.79</td>
<td>(48.04)</td>
<td>0.017**</td>
<td>0.96**</td>
<td></td>
</tr>
<tr>
<td>Pre/F-up</td>
<td>-0.47</td>
<td>0.83</td>
<td>(50.06)</td>
<td>-0.56</td>
<td>0.58</td>
<td>0.23</td>
</tr>
</tbody>
</table>

*Note:* ** = Significant p < .05 * Marginally significant p =< .10 > .05. Effect size * = medium > .50, ** = large > .80.

All contrasts used a compound symmetry covariance model.

Point estimate = estimated mean difference; SE = standard error; t = t test; df = degrees of freedom; p = significance level; effect size = Cohen’s *d*.

EDE-Q = Eating Disorder Examination Questionnaire, SBEQ = Subjective Bing Eating Questionnaire for Baratric Surgery Patients, BSQ = Body shape questionnaire, WHOQOL-BREF = World Health Organization Quality of Life – BREF, AAQ-W = Acceptance and Action Questionnaire for Weight.
Acceptance and Action Questionnaire for Weight, AAQ-W, item factor loadings using Principal component analysis and Varimax rotation.

<table>
<thead>
<tr>
<th>Item</th>
<th>Food as control (1)</th>
<th>Body acceptance (2)</th>
<th>Self-stigma (3)</th>
<th>Self-Efficacy (4)</th>
<th>Emotional avoidance (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. When I have negative feelings, I use food to make myself feel better/När jag har negativa känslor använder jag mat för att må bättre</td>
<td>.61*</td>
<td>.12</td>
<td>.22</td>
<td>.15</td>
<td>.24</td>
</tr>
<tr>
<td>4. I am not in control of what I eat/Jag har inte kontroll över vad jag åter</td>
<td>.68*</td>
<td>.08</td>
<td>.17</td>
<td>.14</td>
<td>.22</td>
</tr>
<tr>
<td>8. In order to eat well and do physical activity, I need to feel like it/För att åta bra och utföra fysisk aktivitet måste jag känna för det</td>
<td>.53*</td>
<td>.18</td>
<td>-.16</td>
<td>-.06</td>
<td>.33</td>
</tr>
<tr>
<td>14. I’m in control of my eating behavior/Jag har kontroll över mitt åt betande</td>
<td>.65*</td>
<td>-.15</td>
<td>.15</td>
<td>.33</td>
<td>-.06</td>
</tr>
<tr>
<td>16. My eating urges control me/Mina sug att åta kontrollerar mig</td>
<td>.78*</td>
<td>-.09</td>
<td>.16</td>
<td>.13</td>
<td>.06</td>
</tr>
<tr>
<td>17. I need to get rid of my eating urges to eat better/Jag måste bli av med mina sug för att åta bättre</td>
<td>.73*</td>
<td>.18</td>
<td>.21</td>
<td>-.00</td>
<td>.06</td>
</tr>
<tr>
<td>11. If I’m overweight, I can’t live the life I want to/Om jag är överviktig kan jag inte leva det liv jag vill leva</td>
<td>.15</td>
<td>.79*</td>
<td>.17</td>
<td>-.17</td>
<td>.02</td>
</tr>
<tr>
<td>1. It’s OK to feel fat/Det är okej att känna sig fet</td>
<td>-.15</td>
<td>.57*</td>
<td>-.19</td>
<td>.33</td>
<td>-.00</td>
</tr>
<tr>
<td>12. If I feel unattractive, there is no point in trying to be intimate/Om jag känner mig oattraktiv är det ingen mening med att försöka vara intim</td>
<td>.10</td>
<td>.75*</td>
<td>.25</td>
<td>-.03</td>
<td>.16</td>
</tr>
<tr>
<td>10. Other people make it hard for me to accept myself/Andra människor gör det svårt för mig att acceptera mig själv</td>
<td>.09</td>
<td>.14</td>
<td>.57*</td>
<td>.26</td>
<td>.40</td>
</tr>
<tr>
<td>19. If I eat something bad, the whole day is a waste/Om jag åter något dåligt är hela dagen bortkastad</td>
<td>.39</td>
<td>.20</td>
<td>.52*</td>
<td>-.10</td>
<td>.20</td>
</tr>
<tr>
<td>20. I should be ashamed of my body/Jag borde skämmas för min kropp</td>
<td>.08</td>
<td>.17</td>
<td>.74*</td>
<td>.11</td>
<td>.27</td>
</tr>
<tr>
<td>21. I need to avoid social situations where people might judge me/Jag måste undvika sociala situationer där andra människor eventuellt kan döma mig</td>
<td>.10</td>
<td>.07</td>
<td>.81*</td>
<td>.08</td>
<td>.08</td>
</tr>
<tr>
<td>22. I will always be overweight/Jag kommer alltid vara överviktig</td>
<td>.22</td>
<td>-.02</td>
<td>.67*</td>
<td>.00</td>
<td>.06</td>
</tr>
<tr>
<td>6. I am in control of how much physical activity I do/Jag har kontroll över hur mycket fysisk aktivitet jag utför</td>
<td>.03</td>
<td>-.12</td>
<td>-.05</td>
<td>.62*</td>
<td>.17</td>
</tr>
<tr>
<td>15. I don’t have what it takes to be healthy for life/Jag har inte det som krävs för att leva ett hälso samt liv</td>
<td>.25</td>
<td>.13</td>
<td>.21</td>
<td>.56*</td>
<td>.17</td>
</tr>
<tr>
<td>7. When I evaluate my weight or my appearance negatively, I am able to recognize that this is just a reaction, not an objective fact./När jag utvärderar min vikt eller mitt utseende negativt, så kan jag se att</td>
<td>.19</td>
<td>.00</td>
<td>.16</td>
<td>.60*</td>
<td>-.15</td>
</tr>
</tbody>
</table>
3. Jag försöker tränga undan tankar och känslor om min kropp eller vikt som jag inte tycker om genom att bara inte tänka på dem

5. Jag anstränger mig intensivt för att undvika att känna mig dålig över min vikt eller hur jag ser ut

9. Jag måste känna mig bättre över hur jag ser ut för att kunna leva det liv jag vill leva

13. Om jag går upp i vikt betyder det att jag har misslyckats

18. Jag är en stabil person

Explained variance

<table>
<thead>
<tr>
<th>Explained variance</th>
<th>3.25</th>
<th>2.20</th>
<th>2.93</th>
<th>1.64</th>
<th>2.20</th>
</tr>
</thead>
</table>

Proportion of total variance

| Proportion of total variance | .15 | .10 | .13 | .07 | .10 |
A clinical research project is not one man's island, but implemented and developed through the efforts, commitment and contributions of many people. Conducting research in a clinical environment is stimulating, fun, and incredibly rewarding, both in the short term when in contact with patients/participants and in the long term when sharing results with others. I want to express my deepest gratitude to supervisors, colleagues, students, friends and family, who directly or indirectly helped me to complete this thesis. You inspired me and made this possible.

To all the participants. Thank you for opening up, being willing and taking steps in life. Thank you for all the things you taught me by sharing your experiences, your strength and wisdom. You made this possible.

JoAnne Dahl, my clinical and scientific supervisor, my friend. You influenced me and my life in every way. I appreciate your sharpness and pragmatic approach. I admire your unshakable foundation in behaviorism and functional analysis, which is evident in every breath. I value your creativity and ability to help people get in touch with and make use of their strengths, curiosity and vitality, as well as how you use natural positive reinforcement in learning situations and introduce new perspectives in funny ways. I highly value your friendship.

Ata Ghaderi my assistant supervisor and support. I think you have influenced me more than you know. I remember when I wrote my master thesis and you asked if I wanted to continue researching. Maybe you recognized my interest before I did. I admire your swift and sharp mind. You have been a great source of information, inspiration and helped me to develop as a researcher. Thank you for your great patience, calming words and emotional support when I needed them.

Steven Hayes, the founder of ACT and co-author. The first time I came in contact with ACT, it seemed so right 😊. The coherent and testable model’s foundation in philosophy and empiricism appealed to me. The pragmatic criterion of truth and focus on function rather than content, have made a world of difference when working with pa-
tients and in structuring research. Thank you for your invaluable commitment in research and in the community. You have created a flat organization characterized by the values of openness and helpfulness. I appreciate the never-ending development and refinement of contextual behavioral science. Thank you for your involvement and time you devoted to this thesis.

*Jason Lillis*, colleague and co-author, far but near. I value your contribution highly. Your true and steadfast commitment to people with obesity is impossible to overlook. You have such great compassion in your voice when talking about the experiences of being obese. Thank you for making a difference. I am happy about our further collaboration in our book, that will soon be published. Exciting!

*Dag Arvidsson*, assistant supervisor and co-author. Thank you for supporting psychological research in a medical context. You have vast professional experience and have supervised several doctoral students over the years. One exciting project was when you introduced minimally invasive surgery in Sweden at the Karolinska Hospital. You surgical skills and innovative surgical techniques are appreciated by many, both nationally and internationally. You also inspired me to be innovation, to believe and try. Thank you.

*My co-workers, surgeons, nurses and dietitians, at the center for minimally invasive surgery*, to name a few including Åsa Karringer Wiberg, Ulrika Brunn, Therese Goding, Monica Edberg, Richard Segerberg, Urs Wenger as well as those who have left the organization such as Tina Gloaugen, Jeanette Steijer, Maria Wiren, Renee Alvarado and Thanos Kakoulidis. Thank you for the excellent medical examinations and care of patients. You are making such a differences for patients pre-operatively, operatively and post-operatively. We are like the boat, with all components needed ☀️. You deserve many thanks for the efforts over the years. Thank you for for the positive and open atmosphere.

*Monica Buhrman*, my fellow doctoral student. I admire your work and research with people suffering from chronic pain. Thank you for being my friend and support in academia and for a lot of fun. It would not have been the same without you. *Jenny Thorsell, Emma Wallin, Anna Finnes, Linnea Molin Carina Wennman*, colleagues and friends. Thank you for collaborations, shared supervision and fruitful discussions. You are excellent clinical psychologists and I am so happy about your on-going research projects and doctoral plans. I am convinced that we will continue to collaborate in the future. I value your friendship and support. *Lotta Fornwall*, my fellow student when writing the master thesis. Thank you Lotta, for the early work on ACT for obesity. Time passes too fast, we should meet again soon.

*Joakim de Man Lapidoth, Kicki Kyhle and Sven Alfonsson*, colleagues within the field of obesity surgery. Thank you for support and collaborations.
tients and in structuring research. Thank you for your invaluable commitment in research and in the community. You have created a flat organization characterized by the values of openness and helpfulness. I appreciate the never-ending development and refinement of contextual behavioral science. Thank you for your involvement and time you devoted to this thesis.

Jason Lillis, colleague and co-author, far but near. I value your contribution highly. Your true and steadfast commitment to people with obesity is impossible to overlook. You have such great compassion in your voice when talking about the experiences of being obese. Thank you for making a difference. I am happy about our further collaboration in our book, that will soon be published. Exciting!

Dag Arvidsson, assistant supervisor and co-author. Thank you for supporting psychological research in a medical context. You have vast professional experience and have supervised several doctoral students over the years. One exciting project was when you introduced minimally invasive surgery in Sweden at the Karolinska Hospital. You surgical skills and innovative surgical techniques are appreciated by many, both nationally and internationally. You also inspired me to be innovation, to believe and try. Thank you.

My co-workers, surgeons, nurses and dietitians, at the center for minimally invasive surgery, to name a few including Åsa Karringer Wiberg, Ulrika Brunn, Therese Goding, Monica Edberg, Richard Segerberg, Urs Wenger as well as those who have left the organization such as Tina Gloaugen, Jeanette Steijer, Maria Wiren, Renee Alvarado and Thanos Kakoulidis. Thank you for the excellent medical examinations and care of patients. You are making such a differences for patients pre-operatively, operatively and post-operatively. We are like the boat, with all components needed. You deserve many thanks for the efforts over the years. Thank you for for the positive and open atmosphere.

Monica Buhrman, my fellow doctoral student. I admire your work and research with people suffering from chronic pain. Thank you for being my friend and support in academia and for a lot of fun. It would not have been the same without you. Jenny Thorsell, Emma Wallin, Anna Finnes, Linnea Molin Carina Wennman, colleagues and friends. Thank you for collaborations, shared supervision and fruitful discussions. You are excellent clinical psychologists and I am so happy about your on-going research projects and doctoral plans. I am convinced that we will continue to collaborate in the future. I value your friendship and support. Lotta Forsnall, my fellow student when writing the master thesis. Thank you Lotta, for the early work on ACT for obesity. Time passes too fast, we should meet again soon.

Joakim de Man Lapidoth, Kicki Kyhle and Sven Alfonsson, colleagues within the field of obesity surgery. Thank you for support and collaborations.
Briann Ljotsson, thank you for reading and commenting the thesis. Thomas Parling and Tobias Lundgren, for inspiring me to go into research. Thank you for supporting me over the years.

Professors, teachers and PhD-students at the department of psychology. Thank you for being helpful in all kinds of questions such as practical, bureaucratic, formal and economical. Former students and now colleagues. Sandra Lindblad, Jenny Fries, Linda Oscarsson, Helena Sjönvall, Li Jacobsson, Nikodemus Enger, Maral Jolstedt, Mattias Dahl, Anton Larsson, Julia Sorokourus, Magnus Brogie, Rebecka and Emelie Decavita, Hampus Enkvist, Emelie Samuelsson, Olof Molander, Lina Josefsson and many other students who I meet over the years. Thank you for all the things you taught me about being a teacher. I look forward to following you in the future in differing professional contexts.

Lisa Berndtsson, Karin Ericsson, Linnea Klint, Isabel SantaMaria, Emma Garrote and all my friends for making it fun. Thank you for dinners, trips, adventures and for always, no matter what, being there for me. I trust in our friendship and that we will share many things in the future. Signe and Rakesh, thank you for all compassion and the wonderful work you are doing.

To Mr. Goenkai, and all Vipassana-people, for teaching me the technique of meditation and seeing things as they are. For showing that simplicity is the greatest gift. I deeply value what you have taught me.

To Jeppe Strandskov, min elskade, for entering my life and giving me love, for all the fun, warm, intellectual and stimulating moments. You showed me the flow of life and awoke resting interests. You make me want to fulfill myself every day. I look forward to all we have ahead of us. ”Fly with me”. Puss :).

To mum and dad thank you for your unconditional love and making me the person I am. For teaching me the importance of adhering to values and for taking care of myself and others as well as the fact that behaviors are far more important than words. For teaching me that behaviors are far more important than words. You are great. To Robert, my brother, for being such a strength in life, ”You are the person who creates your own happiness”.

I love you. Be happy.
References


Scope of the problem, state of the field, and performance of statistical methods. *PLOS One Clinical Trials*, 4(8), e6624. doi: 10.1371/journal.pone.0006624


van der Beek, E., Riele, W., Speeken, T., Boerma, D., & van Ramshorst, B. (2010). The impact of reconstructive procedures following bariatric surgery on patient


A doctoral dissertation from the Faculty of Social Sciences, Uppsala University, is usually a summary of a number of papers. A few copies of the complete dissertation are kept at major Swedish research libraries, while the summary alone is distributed internationally through the series Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Social Sciences.