1-1-2013

Emotion Regulation Difficulties And Psychopathology In Bariatric Surgery Candidates

Rachel Strimas
Ryerson University

Follow this and additional works at: <http://digitalcommons.ryerson.ca/dissertations>

Part of the [Psychology Commons](#)

Recommended Citation

Strimas, Rachel, "Emotion Regulation Difficulties And Psychopathology In Bariatric Surgery Candidates" (2013). *Theses and dissertations*. Paper 1758.

This Dissertation is brought to you for free and open access by Digital Commons @ Ryerson. It has been accepted for inclusion in Theses and dissertations by an authorized administrator of Digital Commons @ Ryerson. For more information, please contact bcameron@ryerson.ca.

EMOTION REGULATION DIFFICULTIES AND PSYCHOPATHOLOGY
IN BARIATRIC SURGERY CANDIDATES

by

Rachel Strimas

Master of Arts, Ryerson University, 2009

Master of Arts, York University, 2007

Bachelor of Kinesiology (Honours), McMaster University, 2005

A dissertation

presented to Ryerson University

in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

in the Program of

Psychology

Toronto, Ontario, Canada, 2013

© Rachel Strimas 2013

I hereby declare that I am the sole author of this dissertation. This is a true copy of the dissertation, including any required final revisions, as accepted by my examiners.

I authorize Ryerson University to lend this dissertation to other institutions or individuals for the purpose of scholarly research.

I further authorize Ryerson University to reproduce this dissertation by photocopying or by other means, in total or in part, at the request of other institutions or individuals for the purpose of scholarly research.

I understand that my dissertation may be made electronically available to the public.

Abstract

Emotion Regulation Difficulties and Psychopathology in Bariatric Surgery Candidates

Doctor of Philosophy, 2013

Rachel Strimas

Psychology, Ryerson University

Evidence suggests high rates of psychiatric disorders in bariatric surgery candidates (e.g., Kalarchian et al., 2007; Mitchell et al., in press), although no rigorous studies have examined the prevalence in a Canadian sample. As such, the first purpose of this study was to assess the prevalence of Axis I disorders, and associations with quality of life, in a sample of consecutively referred bariatric surgery candidates at the Toronto Western Hospital Bariatric Surgery Program. In light of emerging evidence linking emotion regulation difficulties with diverse psychiatric symptoms, the second purpose of this study was to examine whether emotion regulation difficulties were common or specific determinants of mood, anxiety, and eating psychodiagnostic categories, as such information would help inform interventions. Three hundred and twenty-one bariatric surgery candidates (80.1% female; *M* age = 44.37 years) were assessed using a structured psychodiagnostic interview and completed questionnaires of health-related quality of life and emotion regulation difficulties. Results indicated that 54.5% of patients met DSM-IV-TR criteria for a lifetime psychiatric diagnosis and 18.4% met criteria for a current psychiatric disorder. Major depressive disorder was the most common lifetime psychiatric disorder and binge eating disorder was the most prevalent current psychiatric disorder. Compared to patients without a current Axis I disorder, participants diagnosed with a current Axis I disorder reported significantly worse functioning on most mental and physical health domains (p 's < .01). Overall, a series of regression analyses revealed that difficulties

regulating emotions accounted for unique variance in current mood and anxiety disorder status (p 's < .001). Difficulties in emotion regulation were not significantly associated with current eating disorder status after Bonferroni correction. Taken together, these results confirm the high rates of psychiatric disorders in a Canadian sample of bariatric surgery candidates and provide evidence for associated functional health impairment. The data also add to the growing body of literature demonstrating emotion regulation difficulties across psychodiagnostic categories and are consistent with suggestions that psychosocial interventions for bariatric patients might benefit from directly targeting difficulties in emotion regulation. Further study of these associations is needed to replicate these findings and elucidate how difficulties in emotion regulation interact with psychopathology to affect patients' post-operative outcomes.

Acknowledgements

This project would not have been possible without the support and encouragement of many individuals. I would first like to express my sincerest thanks to my advisor of six years, Dr. Michelle Dionne, for seeing promise in my ideas and for sharpening my research and writing skills. Dr. Dionne's insight, feedback, knowledge, time, and mentorship have been instrumental in every step of my graduate pursuits. Thank you also to the members of the Health and Sport Psychology Lab and my graduate cohort for their friendship. I would also like to thank the many people within the Department of Psychology at Ryerson University for the many happy years I have spent here.

I would like to express my appreciation to the members of my supervisory committee, Dr. Stephanie Cassin and Dr. Janice Kuo, for their guidance in the construction and completion of this project. In addition, thank you to Dr. Elaine Santa Mina and Dr. Valerie Taylor for their feedback as members of my examining committee, and Dr. Catherine Middleton for serving as the Chair of the defence.

Very special thanks are extended to the extraordinary Toronto Western Hospital Bariatric Surgery Program Team for their support and encouragement of this project, and assistance with data collection. In particular, I would like to thank Dr. Sanjeev Sockalingam, Director of the Bariatric Surgery Psychosocial Program, whose leadership in clinical and research endeavors is truly exceptional.

For financial support, I thank the Social Sciences and Humanities Research Council of Canada.

Lastly, many thanks are extended to my family and friends for supporting my ambitions. I would especially like to thank my husband, Bevin, for cheering me on. Thank you for your continual interest and confidence in my pursuits.

Table of Contents

Abstract	iii
Acknowledgements	v
List of Tables	vii
List of Figures	viii
List of Appendices	ix
List of Abbreviations	x
Introduction	
<i>Surgical Treatment of Obesity</i>	2
<i>Psychiatric Disorders in Bariatric Surgery Candidates</i>	6
<i>Emotion Regulation and Psychopathology in Bariatric Surgery Candidates</i>	15
<i>Summary</i>	21
<i>Purpose</i>	22
Method	
<i>Participants</i>	24
<i>Measures</i>	25
<i>Procedure</i>	30
Results	
<i>Demographic and Clinical Characteristics</i>	31
<i>Prevalence of Axis I Lifetime and Current Psychiatric Disorders</i>	33
<i>Factors Associated with Psychiatric Disorders</i>	37
<i>Emotion Regulation</i>	42
<i>Emotion Regulation and Psychiatric Disorders</i>	45
Discussion	
<i>Prevalence of Axis I Lifetime and Current Psychiatric Disorders</i>	56
<i>Factors Associated with Psychiatric Disorders</i>	60
<i>Emotion Regulation and Psychopathology in Bariatric Surgery Candidates</i>	62
<i>Strengths and Limitations</i>	68
<i>Implications, Recommendations, and Directions for Future Research</i>	75
<i>Conclusions</i>	82
Appendices	84
References	91

List of Tables

Table 1: Classification of Weight Status	2
Table 2: Bariatric Surgery Procedures	5
Table 3: Rates of Lifetime Psychiatric Disorders in Bariatric Surgery Candidates	13
Table 4: Rates of Current Psychiatric Disorders in Bariatric Surgery Candidates	14
Table 5: Axis I Psychiatric Disorders Assessed and ‘Current’ Time Frame	27
Table 6: Sociodemographic Characteristics of Bariatric Surgery Candidates	32
Table 7: Prevalence of Current and Lifetime Axis I Psychiatric Disorders in Bariatric Surgery Candidates	34
Table 8: Comparisons of Bariatric Surgery Candidates’ SF-36 Scores to Canadian Normative Data	39
Table 9: Associations Between Current Psychiatric Disorder and Health Status in Bariatric Surgery Candidates	40
Table 10: Means and Standard Deviations for Difficulties in Emotion Regulation Total And Subscale Scores in Bariatric Surgery Candidates	42
Table 11: Comparisons of Difficulties in Emotion Regulation Total and Subscale Scores Across Studies and Results of <i>T</i> -tests by Group	44
Table 12: Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Axis I Disorder Status	47
Table 13: Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Mood Disorder Status	48
Table 14: Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Anxiety Disorder Status	49
Table 15: Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Eating Disorder Status	50
Table 16: Regression Analysis Predicting Current Mood Disorder Status as a Function of Current Anxiety Disorder Status and Emotion Regulation Difficulties	53
Table 17: Regression Analysis Predicting Current Anxiety Disorder Status as a Function of Current Mood and Eating Disorder Status and Emotion Regulation Difficulties	54
Table 18: Regression Analysis Predicting the Total Number of Current Axis I Disorders as a Function of Emotion Regulation Difficulties	55

List of Figures

Figure 1: Associations between current psychiatric disorder and health status in bariatric surgery candidates	41
---	----

List of Appendices

Appendix A: M.I.N.I. Supplemental Module for the Assessment of Binge Eating Disorder	84
Appendix B: Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Major Depressive Disorder Status	86
Appendix C: Logistic Regression: Tests of Assumptions and Diagnostic Statistics	87
Appendix D: Linear Regression: Tests of Assumptions and Diagnostic Statistics	89

List of Abbreviations

BMI	Body Mass Index
CBT	Cognitive-Behavioural Therapy
DERS	Difficulties in Emotion Regulation Scale
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, 4 th edition
M.I.N.I.	M.I.N.I. International Neuropsychiatric Interview for ADHD Studies version 6.0
NIH	National Institutes of Health
RYGB	Roux-en-Y gastric bypass
SF-36	Medical Outcomes Study 36-item Short-Form Health Survey
TWH	Toronto Western Hospital
WHO	World Health Organization

Emotion Regulation and Psychopathology in Bariatric Surgery Candidates

Obesity, now of epidemic proportions, has been declared one of the major concerns for global health by the World Health Organization (WHO, 2010a). In 2005, approximately 1.6 billion adults worldwide were overweight and at least 400 million adults were obese (WHO, 2010b). Recent projections indicate that by 2015, 2.3 billion adults will be overweight and 700 million more will be obese (WHO, 2010b). All overweight and obese individuals are at elevated risk of developing chronic and debilitating conditions such as cardiovascular disease, type 2 diabetes, osteoarthritis, and breast, prostate and colon cancer. In addition, the economic burden of obesity is high, with associated costs accounting for 2-6% of health care expenditure in developed countries (WHO, 2010b).

Several different methods are used to determine overweight and obesity, including measures of waist circumference, skinfold thickness, and underwater weighing. Due to its ease of use and acceptable approximations of body fat in the population (Micozzi, Albanes, Jones, & Chumlea, 1986), the most popular measure of body mass is the body mass index (BMI), which is calculated by dividing weight in kilograms by the square of height in metres (kg/m^2). Obesity is commonly defined as a $\text{BMI} \geq 30 \text{ kg/m}^2$ in a classification system where underweight is 18.5 kg/m^2 , normal weight is 18.5 to 24.9 kg/m^2 , and overweight is 25.0 to 29.9 kg/m^2 (WHO, 1998; National Institutes of Health [NIH], 1998). The obese category may be further categorized into class 1 obesity, class 2 obesity, and class 3 obesity (see Table 1). The risk of health-related complications increases in a linear fashion with increasing BMI (see McTigue, Harries, Hemphill, Lux, Sutton, Bunton, & Lohr, 2003; WHO, 2010a); thus, as individuals move up obesity subcategories, their risk of developing life-threatening comorbidities increases as well.

Currently, the BMI groups experiencing the most rapid increase in prevalence are within the 35+ and 40+ range (Flegal, Carroll, Ogden, & Johnson, 2002; Sturm, 2003).

Table 1

Classification of Weight Status

Weight status	BMI (kg/m ²)
Underweight	< 18.5
Normal weight	18.5 – 24.9
Overweight	25.0 – 29.9
Obese (Class I)	30.0 – 34.9
Obese (Class II)	35.0 – 39.9
Extreme obesity (Class III)	≥ 40
<i>Note.</i> Classifications are defined by the National Institutes of Health (1998).	

Surgical Treatment of Obesity

Current treatments of obesity include dietary restriction (i.e., low-calorie and very-low-calorie diets), increased physical activity, pharmacological agents, and surgery (see Taylor, Stonehocker, Steele, & Sharma, 2012). Dietary changes and exercise are often targeted with behavioural interventions that address skills acquisition and motivational issues to help individuals change lifestyle patterns. However, systematic review of dietary and physical activity interventions alone or in combination with other treatments indicates only modest weight

loss (3 to 5 kg) over 12 months (McTigue et al., 2003). Maintenance strategies may help to sustain weight loss, but gradual weight regain tends to follow initial weight loss in the absence of sustained adherence to the regimen (Douketis, Feightner, Attia, & Feldman, 1999; McTigue et al., 2003). Therapy with medications (e.g., orlistat) may be indicated for the treatment of obesity or in overweight individuals with comorbid health conditions. Systematic evaluations of various pharmacological agents, however, have found modest weight loss (3 to 5 kg) over 6 months and weight regain after discontinuation of the medication (Arterburn & Noel, 2001; McTigue et al., 2003). In light of the serious health sequelae associated with obesity, and the long-term ineffectiveness of dietary, physical activity and pharmacological weight loss interventions, surgical treatment for obesity, or “bariatric surgery,” is now a viable treatment option for obese patients (NIH, 1998).

Prospective study of post-operative bariatric patients has demonstrated sustained (> 10 years) and substantial (> 15%) weight loss, reduced mortality rates, and dramatic improvements in quality of life relative to obese controls (Sjöström, 2000; Sjöström, Lissner, Wedel, & Sjöström, 1999; Sjöström et al., 2007). Currently, bariatric surgery is recommended for patients with “clinically severe obesity” as indexed by BMI and related high-risk conditions (NIH Consensus Development Conference Panel, 1991). It is recognized, however, that surgical interventions are considered adjuncts to necessary dietary and activity changes if weight loss is to be sustained. Bariatric surgery candidates are those with a BMI ≥ 40 or patients with a BMI ≥ 35 with at least one comorbidity associated with obesity, such as obstructive sleep apnea, type 2 diabetes mellitus, or obesity-related physical ailments such as joint disease (NIH Consensus Development Conference Panel, 1991). In addition, candidates for surgery must be motivated, aware of the long-term dietary and lifestyle adaptations, and have had previous ineffective

weight loss attempts. Currently, a consensus on absolute contraindications for surgery does not exist. Suggested contraindications include serious uncontrolled psychiatric disorder (e.g., psychosis, posttraumatic stress disorder, depression), active substance abuse or dependence (i.e., cigarettes, recreational drugs, or excessive alcohol consumption), and medical or surgical conditions that elevate operative risk (e.g., severe congestive heart failure). Patients who cannot comprehend or adhere to the lifestyle and dietary changes required post-operatively despite education should also not be recommended for surgery (Mechanick et al., 2008; NIH Consensus Development Conference Panel, 1991).

Three broad categories of bariatric surgery procedures exist: 1) restrictive procedures, which limit the stomach's capacity for food; 2) malabsorptive procedures, which interfere with the digestion of food; or 3) a combination of restrictive and malabsorptive procedures (see Table 2). Amongst the currently available surgical options, the Roux-en-Y gastric bypass (RYGB) is the most widely performed bariatric operation in North America due to its low mortality, significant weight loss, and reduction in obesity-related comorbidities such as type 2 diabetes, hypertension, hyperlipidemia, and sleep apnea (Buchwald, Avidor, Braunwald, Jensen, Pories, Fahrbach, & Schoelles, 2004; Picot, Jones, Colquitt, Gospodarevskaya, Loveman, Baxter, & Clegg, 2009; Sjöström et al., 2007). In this procedure, the upper part of the stomach is transacted producing a small stomach pouch that restricts food intake to 10 to 30 mL. The gastric pouch is attached to a section of the small intestine, the jejunum, allowing food to bypass a large portion of the stomach, duodenum, and proximal jejunum. These modifications drastically restrict the size of the stomach, delay gastric emptying, and limit the absorption of calories, which together result in significant weight loss.

Table 2

Bariatric Surgery Procedures

Type of Bariatric Surgery	Classification
Biliopancreatic junction	Malabsorption
Jejunioileal bypass	Malabsorption
Biliopancreatic diversion with duodenal switch	Restriction and Malabsorption
Roux-en-Y gastric bypass	Restriction and Malabsorption
Vertical banded gastroplasty	Restriction
Laparoscopic adjustable gastric band	Restriction
Laparoscopic sleeve gastrectomy	Restriction
Intragastric balloon	Restriction

The RYGB has been shown to produce significant and durable weight loss in various controlled studies. In the Swedish Obese Subjects (SOS) study, in which bariatric surgery patients and non-surgical obese controls were followed for an average of 10.9 years post-operatively, Sjöström and colleagues (2007) reported a mean absolute weight change of $\pm 2\%$ in the non-surgical obese controls versus a maximum weight loss of 20% in banding patients, 25% in vertical banded gastroplasty, and 32% in gastric bypass patients. Ten years post-operatively, the absolute weight loss in the surgical groups stabilized at 14%, 16%, and 25%, respectively.

A recent review found that the RYGB procedure consistently demonstrated a superior and clinically significant difference in weight loss, and resolution of obesity-related comorbidities, relative to the laparoscopic adjustable gastric banding procedure, which is the most common bariatric surgery in Europe and Australia (Tice, Karliner, Walsh, Petersen, Feldman, 2008).

Indeed, most patients undergoing the RYGB experienced complete resolution of their diabetes, obstructive sleep apnea, and hypertension (Buchwald et al., 2004; Salehi, Prigeon, & D'Alessio, 2011; Tice et al., 2008). It is also common for reports to detail weight loss results in terms of mean percentage of excess weight loss, which is calculated as $\text{total weight loss} / \text{excess weight loss} \times 100$, where $\text{excess weight} = \text{total pre-operative weight} - \text{ideal weight}$. Data from a recent meta-analysis comparing post-operative weight loss found significantly greater excess weight loss for the RYGB procedure than the laparoscopic adjustable gastric banding procedure at 1 year post-surgery (61.5% vs. 42.6%), 2 years post-surgery (69.7% vs. 50.3%), and >3 years post-surgery (71.2% vs. 55.2%; Garb, Welch, Zagarins, Kuhn, & Romanelli, 2009). Composite estimates of percent excess weight loss were approximately 63% for the RYGB versus 49% for the laparoscopic adjustable gastric banding procedure (Garb et al., 2009), which are similar to values reported by Buchwald and colleagues (2004) in an earlier systematic review and meta-analysis. Thus, patients who underwent RYGB surgery had greater sustained weight loss relative to patients who had gastric banding. The RYGB is, however, associated with more nutritional deficiencies due to the malabsorptive component, and strict adherence to the post-operative dietary regimen and vitamin supplementation is essential to ward off nutritional complications (Ledoux et al., 2006). Nevertheless, these dramatic improvements in obesity comorbidities, substantial and prolonged weight loss, and the low rate of complications and mortality, make the RYGB procedure the “gold standard” for bariatric surgery.

Psychiatric Disorders in Bariatric Surgery Candidates

Despite the benefits of bariatric surgery, and RYGB in particular, as many as 20% of patients fail to lose a significant amount of weight (Sugerman et al., 1989), which has been attributed to psychosocial factors that may affect patients' ability to adapt and adhere to the post-

operative lifestyle changes (Hsu et al., 1998). For instance, a recent review examined psychosocial predictors of post-operative weight loss following RYGB and found that lifetime or current Axis I psychiatric disorders, particularly disorders of mood and anxiety, were important predictors of reduced weight loss after surgery (Sockalingam, Hawa, Wnuk, Strimas, & Kennedy, 2011). In addition, Sockalingam and colleagues (2011) reported that post-operative loss of control over eating, a component of binge eating, was correlated with weight regain following RYGB. It is perhaps not surprising that patients with past or present mood or anxiety disorders exhibit less weight loss after surgery as a substantial body of evidence has linked emotional eating with negative affective states, suggesting that some individuals may eat in attempt to provide temporary comfort or distraction from unpleasant emotions (see Polivy & Herman, 1993 and Heatherton & Baumeister, 1991 for reviews; Stice, 2001; Waller, 2000). In addition, symptoms of depression and anxiety may indirectly affect food intake by impinging upon the patient's ability to adhere to lifelong changes in dietary habits. Aside from the effects of psychopathology on post-operative weight loss, psychiatric comorbidity predicts worse quality of life in bariatric surgery samples (Kalarchian et al., 2007; Mauri et al., 2008), suggesting that poor mental health also impairs psychosocial and functional status in this group.

Owing to the effect of psychiatric morbidity on post-operative outcomes, most bariatric surgery programs require patients to have a pre-operative mental health assessment (Bauchowitz et al., 2005; Devlin, Goldfein, Flancbaum, Bessler, & Eisenstadt, 2004; Santry, Chin, Cagney, Alverdy, & Lauderdale, 2006). This requirement has been articulated by the NIH (1991) who advised that surgical candidates be evaluated by a multidisciplinary team that includes psychiatric expertise. Due to methodological differences in study purpose and diagnostic

measures, however, the prevalence¹ of psychiatric disorders in bariatric surgery candidates is not fully understood. For instance, Kinzl, Schrattenecker, Traweger, Mattesich, Fiala, and Biebl (2006) used a semi-structured diagnostic interview to assess the pre-operative psychiatric status of 140 female patients and found that 32% of the sample met diagnostic criteria for one psychiatric disorder. However, because the primary purpose of this study was to examine predictors of post-surgical weight loss, Kinzl and colleagues (2006) only provided a global estimate of having *any* psychiatric disorder and did not report prevalence estimates for specific psychiatric disorders. Other studies have used questionnaires and informal interview methods to estimate the prevalence of psychiatric disorders. For instance, in 294 bariatric surgery candidates, Rosik (2005) used the Psychiatric Diagnostic Screening Questionnaires (PDSQ) to assess 13 DSM-IV Axis I disorders (*Diagnostic and Statistical Manual of Mental Disorders* [4th ed.], text revision; American Psychiatric Association [APA], 2000). Based on this questionnaire, the authors found that approximately 50% of patients endorsed criteria that suggests an Axis I disorder, with somatization (30%), social phobia (18%), hypochondriasis (15%), and obsessive-compulsive disorder (14%) diagnosed most frequently. In another study, 90 bariatric surgery candidates completed a battery of questionnaires that assessed binge eating, eating disorders, and depressive symptoms (Sarwer et al., 2004). A psychologist then reviewed the patients' responses and completed a supplementary in-person assessment. Overall, 62% of patients had at least one

¹ Prevalence refers to the number of individuals with a given condition (e.g., a psychiatric disorder) in a sample. It is calculated by dividing the number of people who have the condition by the total number of people studied and expressed as a percentage. "Point prevalence" (often simply termed "prevalence") refers to the proportion of the population that has the condition at a specified point in time, often the time of study (e.g., "current prevalence"). "Lifetime prevalence" refers to the proportion of the sample that have had the condition at some point in their life, up to the time of the assessment. Prevalence should be distinguished from incidence, which refers to the rate of occurrence of *new* cases of disorder in a population rather than the *total* number of cases of disorder in a population (Kraemer, Kazdin, Offord, Kessler, Jensen, & Kupfer, 1997).

current diagnosis: 31% had major depressive disorder, 27% had binge eating disorder, and 17% had substance abuse or dependence in sustained full remission.

As Bocchieri, Meana, and Fisher (2002) aptly note in their review, in the early phases of a field of study it is common to use assorted assessment measures as research questions are developed and assessment procedures are refined. When studying the prevalence of psychiatric disorders, however, the trouble in relying upon self-report questionnaires is possible over- and underreporting of symptoms, which compromises the validity and reliability of the diagnosis. Accurate classification of psychological symptoms can be challenging in a group of morbidly obese patients as their physical health symptoms can confound with psychiatric symptoms (e.g., lack of energy, sleep difficulty, hyperphagia). In contrast, administration of a diagnostic interview allows an experienced interviewer to probe the patient's responses to see whether his or her symptoms are attributable to medical or psychiatric conditions.

To better understand the prevalence of psychiatric disorders in bariatric surgery candidates, recent studies have used DSM-IV criteria and standardized diagnostic interviews. Rosenberger, Henderson, and Grilo (2006) assessed 147 pre-surgical RYGB patients in the United States and found that 37% of patients had at least one lifetime Axis I disorder. Lifetime mood, anxiety, eating or substance use disorder was diagnosed in 22%, 16%, 14% and 5% of patients, respectively. Twenty-four percent of participants reported a current Axis I disorder, with mood, anxiety, and eating disorders diagnosed in 11%, 12%, and 10% of patients, respectively. Fewer than 1% of patients reported a current substance use disorder. In a study conducted in Italy, Mauri and colleagues (2008) examined estimates of psychiatric disorders in 282 RYGB candidates and found that 38% reported a lifetime Axis I disorder and 21% reported a current Axis I disorder. In this study, a lifetime mood disorder was most common (22%), followed by

anxiety disorder (18%), eating disorder (13%), and substance use disorder (1%). Current anxiety, eating, and mood disorders were diagnosed in 12%, 7%, and 6% of patients, respectively. Substance use disorders were not diagnosed in any surgical candidates. Kalarchian and colleagues (2007) assessed 288 bariatric surgery candidates in the United States and found that 66% of patients met diagnostic criteria for a lifetime Axis I disorder: a lifetime mood disorder was most prevalent (46%), followed by diagnoses of anxiety (38%), substance use (33%), and eating (30%) disorders. Current mood, anxiety, substance use, and eating disorders were reported in 16%, 24%, 2%, and 16% of patients. Finally, in 146 bariatric surgery candidates residing in Germany, Mühlhans, Horbach, and de Zwaan (2009) found that 72% of patients met diagnostic criteria for at least one lifetime disorder, with mood, eating, anxiety, and substance use disorders diagnosed in 55%, 50%, 21%, and 15%, respectively. Fifty six percent of patients reported at least one current psychiatric disorder with eating disorders diagnosed most frequently (38%), followed by mood (32%), anxiety (15%), and substance use disorders (1%). Overall, most of these studies found elevated rates of psychiatric disorders in bariatric surgery candidates relative to general population norms (Kalarchian et al., 2007; Mauri et al., 2008; Mühlhans et al., 2009).

Thus, in these studies, when prevalence rates were based upon standardized, semi-structured interviews and DSM-IV criteria, estimates of lifetime and current Axis I disorders ranged from 37-73% and 24-56%, respectively. Amongst the reviewed studies, mood disorders – and major depressive disorder in particular – were consistently diagnosed as the most common lifetime disorder, with estimates ranging from 22 to 55%. With the exception of Mühlhans and colleagues (2009), who reported that eating disorders were the most common current diagnosis, anxiety disorders were most prevalent, with estimates ranging from 12 to 24% of patients. The

single most common psychiatric disorders at the time of pre-operative assessment were major depressive disorder (Mühlhans et al. 2009), binge eating disorder (Kalarchian et al., 2007; Mauri et al., 2008), and eating disorder not otherwise specified, excluding diagnoses of binge eating disorder (Rosenberger et al., 2006).

The implications of these findings are twofold. Firstly, these studies included large sample sizes, standardized diagnostic assessments, and DSM-IV criteria, yet there was considerable variation in the prevalence of psychiatric disorders. Interestingly, the discrepancy among prevalence estimates narrows when the timing of the evaluation is considered (see Tables 3 and 4). Specifically, when psychiatric assessments were conducted separately from the pre-surgical screening process, the lifetime prevalence of Axis I disorders ranged from 72 to 83% and the current prevalence of psychiatric disorders ranged from 38 to 56% (Kalarchian et al., 2007; Mühlhans et al., 2009). On the other hand, when psychiatric assessments were conducted as part of the pre-surgical screening process, the prevalence estimates narrow considerably. Specifically, the lifetime prevalence of Axis I disorders ranged from 37 to 38%, and the current prevalence of Axis I disorders ranged from 21 to 24% (Mauri et al., 2008; Rosenberger et al., 2006). This suggests that patients report less psychopathology when the assessment is conducted in conjunction with the pre-surgical evaluation, indicating that patients may minimize their symptoms in an attempt to appear suitable for surgery.

A second explanation for the discrepancy in these investigations may originate from the study sample. In fact, cross-study comparisons of prevalence rates may be misleading due to sample-based differences in sociodemographics. For instance, patients residing in the United States have various payment methods for healthcare, including Medicaid or Medicare, Blue Cross/Blue Shield, public aid, or private insurance coverage (e.g., see Black, Goldstein, &

Mason, 1992; Rosik, 2005). Because patients without healthcare funding or insurance would presumably be ineligible for bariatric surgery, those who qualify for surgery may reflect a unique socioeconomic group. Mühlhans and colleagues (2009) note that healthcare insurance is more common among German citizens compared to US citizens. In contrast, healthcare in Canada is publically funded and costs are generally paid through funding from income taxes, thereby ensuring that all citizens receive the same care. Private insurance and “out of pocket” payments are a very minimal part of the overall healthcare system in Canada. Thus, regardless of socioeconomic status, providing the patient is deemed eligible for surgery by the multidisciplinary team and can afford the necessary pre- and post-operative nutritional supplements, patients living in Canada can qualify as bariatric surgery patients. In turn, there should be no confound between lower socioeconomic status and psychiatric diagnosis present in Canadian data. Further investigations that study different populations are therefore required. In particular, there is a need to examine the prevalence of psychiatric disorders in a Canadian sample of bariatric surgery patients, which, in a publically funded health care system, may be comprised of patients who differ in sociodemographics.

Table 3

Rates of Lifetime Psychiatric Disorders in Bariatric Surgery Candidates

Study	Measure	Method	Sample	% Female	Any Axis I Disorder	Any Mood Disorder	Any Anxiety Disorder	Any Substance Disorder	Any Eating Disorder
Independent from Surgical Screening and Approval Process									
Mühlhans et al. (2009)	SCID-I	In-person	Germany N = 146	71.9	72.6	54.8*	21.2	15.1	50.0
Kalarchian et al. (2007)	SCID-I	Telephone	USA N = 288	83.3	66.3	45.5*	37.5	32.6	29.5
Not Independent from Surgical Screening and Approval Process									
Mauri et al. (2008)	SCID-I	In-person	Italy N = 282	79.8	37.6	22.0*	18.1	1.1	12.8
Rosenberger et al. (2006)	SCID-I	Telephone	USA N = 174	75.3	36.8	22.4*	15.5	5.2	13.8

Note. SCID-I = Structured Clinical Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 2002).

Note. Independent = Assessments were completed independent of the approval process for surgery as part of a research study. Not Independent = Assessments were completed as part of the pre-operative assessment process.

* = most common class of lifetime disorder.

Table 4

Rates of Current Psychiatric Disorders in Bariatric Surgery Candidates

Study	Measure	Method	Sample	% Female	Any Axis I Disorder	Any Mood Disorder	Any Anxiety Disorder	Any Substance Disorder	Any Eating Disorder
Independent from Surgical Screening and Approval Process									
Mühlhans et al. (2009)	SCID-I	In-person	Germany N = 146	71.9	55.5	31.5	15.1	1.4	37.7*
Kalarchian et al. (2007)	SCID-I	Telephone	USA N = 288	83.3	37.8	15.6	24.0*	1.7	16.3
Not Independent from Surgical Screening and Approval Process									
Mauri et al. (2008)	SCID-I	In-person	Italy N = 282	79.8	20.9	6.4	12.4*	0.0	7.1
Rosenberger et al. (2006)	SCID-I	Telephone	USA N = 174	75.3	24.1	10.9	11.5*	0.6	10.3

Note. SCID-I = Structured Clinical Interview for DSM-IV (First et al., 2002).

Note. Independent = Assessments were completed independent of the approval process for surgery as part of a research study. Not Independent = Assessments were completed as part of the pre-operative assessment process.

* = most common class of lifetime disorder.

Emotion Regulation and Psychopathology in Bariatric Surgery Candidates

In light of the increasing popularity of bariatric surgery and high, albeit inconsistent, rates of psychiatric co-morbidity that may affect weight loss and quality of life, early identification and management of psychiatric morbidity is essential to maximize patients' post-operative success. Although past or present psychiatric disorders are not contraindications for bariatric surgery per se, it has been suggested that pre-operative treatment and post-operative support be provided to optimally prepare patients for surgery and enhance the likelihood of long-term success (Kalarchian et al., 2007; Mauri et al., 2008). Given the range of psychopathologies reported amongst bariatric patients, the challenge, of course, is to appropriately identify the individuals who would benefit from support and to provide an efficacious, timely, and cost-effective intervention.

Interestingly, recent conceptualizations of diverse psychiatric disorders underscore their commonalities rather than their differences, with increasing emphasis being placed on emotion regulation as a feature that different psychiatric disorders may share (e.g., Barlow, Allen, & Choate, 2004; Fairburn, 2008). Theorists who study eating behaviour posit that individuals who engage in disordered eating may be predisposed to emotions that are more intense and longer-lasting, which are more difficult to regulate (Lavender & Anderson, 2010; Whiteside, Chen, Neighbors, Hunter, Lo, & Larimer, 2007). These individuals may therefore rely on problematic emotion regulation strategies, such as binge eating, because more adaptive strategies are not used or are not sufficiently effective. In the case of mood and anxiety disorders, difficulty regulating emotions is so paramount that these disorders are largely defined by disturbance in emotions (Gross & Muñoz, 1995; Mineka & Sutton, 1992). Causal models of these so-called "distress disorders" (Watson, 2005) suggest that individuals who cannot adaptively regulate their

emotions are susceptible to longer and more intense emotional experiences, which may develop into diagnosable depression or anxiety (e.g., Campbell-Sills & Barlow, 2006; Mennin, Holoway, Fresco, Moore, & Heimberg, 2007; Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008).

Accordingly, components of emotion regulation have been incorporated into various clinical interventions, including dialectical behaviour therapy (Linehan, 1993; Wiser & Telch, 1999), cognitive behaviour therapy (Barlow, Allen, & Choate, 2004; Fairburn, 2008), and mindfulness-based therapies (Segal, Williams, & Teasdale, 2002).

Emotion and Emotion Regulation. Myriad definitions of emotion and emotion regulation exist and a consensus is lacking on the best conceptualizations. It is therefore critical to clearly operationalize these terms before studying these constructs. Given the complexity in defining emotion, one widely used conceptual framework aims to explicate the typical features of an emotional response (Gross, 1998; Gross & Thompson, 2007), which has been summarized by Werner and Gross (2010). Briefly, one characteristic of emotion is its *trigger*, which can be categorized as internal (e.g., anticipating a presentation) or external (e.g., watching a scary movie). Next, the trigger is *attended to* and *appraised* by the individual, which in turn generates an emotional, physiological, and/or behavioural *response* (e.g., anxiety, heart racing, leaving a situation). Gross and Thompson's (2007) model also underscores the importance of emotions being "recursive;" that is, the emotion often changes the situation that prompted the response (see Werner & Gross, 2010). Finally, as conceptualized by Gross (1998) and Gross and Thompson (2007), emotions are *malleable*; that is, emotions must compete with, and can be superseded by, co-occurring responses to the situation (Werner & Gross, 2010).

Although emotions serve several important functions (Keltner & Gross, 1999), emotions can be problematic when they are contextually insensitive, are too intense, or last too long

(Werner & Gross, 2010). The notion that emotions can be maladaptive introduces the concept of emotion regulation. Likely owing to the absence of an agreed-upon conceptualization of emotion regulation, however, this construct has been studied in a multitude of ways. Some researchers use an assortment of measures (e.g., measures of affective control, emotional response tendencies, emotional intelligence) that are theoretically related to emotion regulation in attempt to capture this construct (e.g., see Mennin et al., 2007). The Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990) and the Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) are self-report measures of emotion regulation. However, the NMR fails to assess the context in which the regulation strategies were used and the TMMS does not measure the ability to engage in goal-directed behaviour when experiencing distress, which is a pertinent component of emotion regulation (Gratz & Roemer, 2004). In an attempt to address these limitations, Gratz and Roemer (2004) developed a comprehensive, integrative measure of difficulties in emotion regulation, called the Difficulties in Emotion Regulation Scale (DERS). As the name suggests, this self-report measure captures “difficulties” regulating emotions, which is particularly useful when studying psychiatric disorders as researchers seek to understand variables that contribute to the onset and maintenance of psychopathology. Gratz and Roemer’s (2004) conceptualization of emotion regulation, and the viewpoint that will be used in this paper, emphasizes the functional nature of emotional responses, with difficulties in emotion regulation defined as “maladaptive emotional responses or difficulties acting effectively in the context of emotionally salient events” (see Tull & Gratz, 2008, p. 200). Specifically, Gratz and Roemer (2004) conceptualize emotion regulation as involving: “(a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviours and behave in accordance with desired goals when experiencing

negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands” (pp. 42-43). Notably, the ability to use these strategies to regulate emotions is adaptive in many ways. In psychopathology, however, ineffective emotion regulation may occur if these strategies are implemented in an overly rigid, inflexible, context-insensitive fashion that is incongruent with one’s long-term goals and values.

Emotion Regulation and Psychopathology. Recent evidence supports the theoretical contention that emotion regulation difficulties are associated with eating-related psychopathology. Briefly, in a sample of 695 male and female undergraduate students, Whiteside and colleagues (2007) found that difficulties regulating emotions predicted approximately 6% of the variance in binge eating, as measured by the Eating Disorders Diagnostic Scale (Stice, Telch, & Rizvi, 2000), after controlling for participants’ sex, dietary restriction, and over-evaluation of weight and shape. Further analysis indicated that limited access to emotion regulation strategies and lack of emotional clarity uniquely predicted more binge eating (Whiteside et al., 2009), suggesting that binge eaters may have fewer strategies to interpret, modulate, or tolerate emotions. In a sample of 296 undergraduate males, Lavender and Anderson (2010) found that difficulties in emotion regulation significantly contributed to body dissatisfaction and disordered eating, as measured by the Eating Disorder Examination-Questionnaire (Fairburn & Bèglin, 1994), above and beyond the variance accounted for by negative affect and BMI. Further analyses indicated that nonacceptance of emotional responses and limited access to emotion regulation strategies uniquely predicted body dissatisfaction, and limited access to emotion regulation strategies uniquely predicted disordered eating.

As would be hypothesized, patients with eating disorders exhibit significantly higher scores on the DERS, indicating poorer emotion regulation, relative to non-eating disordered individuals (Harrison, Sullivan, Tchanturia, & Treasure, 2010). A comparison of descriptive statistics shows that those with anorexia nervosa or bulimia nervosa exhibit the greatest difficulty regulating emotions (median DERS = 127), followed by those with eating disorder symptoms ($M = 96.19$, $SD = 24.96$; Whiteside et al., 2007), followed by healthy females ($M = 78.88$, $SD = 18.20$; Whiteside et al., 2007) and healthy males ($M = 76.72$, $SD = 19.22$; Anderson & Lavender, 2010). Together, these reports suggest that emotion regulation difficulties are associated with disordered eating behaviour in males and females, and in clinical and non-clinical samples.

Recent studies have also provided evidence for associations between emotion regulation difficulties and anxiety. In 325 undergraduate students, Salters-Pedneault, Roemer, Tull, Rucker, and Mennin (2006) tested the hypothesis that self-reported worry, the core feature of generalized anxiety disorder, would be associated with emotion regulation difficulties. Participants self-reported their worry and the Generalized Anxiety Disorders Questionnaire (GAD-Q-IV; Newman, Zuellig, & Kachin, 2002) was used to assess DSM-IV criteria for generalized anxiety disorder. As hypothesized, with the exception of the awareness subscale, self-reported worry was significantly associated with the DERS total and subscale scores. These relationships remained significant when the variance contributed by negative affectivity was accounted for. In addition, individuals who met GAD-Q-IV criteria for generalized anxiety disorder diagnoses had significantly more difficulties regulating emotions relative to those without an analogue generalized anxiety disorder diagnosis ($M = 94.81$, $SD = 22.96$ versus $M = 78.22$, $SD = 22.00$). Again, these associations persisted after negative affectivity was added as a covariate. Recently, Suveg, Morelen, Brewer, and Thomassin (2010) found that greater emotion

regulation difficulties predicted higher anxiety, as measured by the Anxiety Subscale of the Symptom Checklist-90-Revised (Derogatis, 1994). Further examination using path analyses found that difficulties regulating emotions played a mediating role between both temperamental (i.e., behavioural inhibition) and environmental factors (i.e., family emotional environment, family interactions) and anxiety symptoms, suggesting that difficulties regulating emotions may contribute to the development or maintenance of anxiety symptoms. Together, these findings support the relation between emotion regulation difficulties and anxiety symptoms.

There is also evidence that depression is associated with self-reported emotion regulation difficulties. Ehring, Fischer, Schnülle, Bösterling, and Tuschen-Caffier (2008) compared 42 ‘recovered depressed’ participants to 42 ‘never depressed’ controls and found that the ‘recovered depressed’ participants reported significantly higher scores on the limited access to emotion regulation strategies, difficulties engaging in goal-directed behaviour, and acceptance subscales of the DERS, which remained significant after controlling for negative mood. In regression analyses predicting the presence or absence of past depression, the only DERS variable to emerge as a significant predictor was difficulties engaging in goal-directed behaviour. A subsequent study by Tull and Gratz (2008) found that difficulties engaging in goal-directed behaviour mediated the relationship between anxiety sensitivity and depression symptom severity. The authors suggest that individuals vulnerable to depression may misinterpret features of anxiety sensitivity (e.g., poor concentration) as indicators of an impending depressive state, which further increases distress and anxiety. Increased distress, in turn, may limit an individual’s ability to engage in goal-directed behaviour, thereby decreasing exposure to positively reinforcing behaviours, which increases risk of depression. Finally, Weinberg and Klonsky (2009) examined difficulties regulating emotions in 428 participants and found that the

DERS total score exhibited significant correlations with symptoms of depression, anxiety, and eating disorders. Symptoms of depression showed the highest correlations with the DERS ($r = .65, p < .001$), followed by symptoms of anxiety ($r = .42, p < .001$), and eating disorders ($r = .38, p < .001$). Notably, with the exception of the awareness subscale, which exhibited a small correlation with eating disorder symptoms ($r = .13, p < .05$), all DERS subscales were highly correlated with depression, anxiety, and eating disorder symptoms ($p < .001$), supporting the notion that broad deficits in emotion regulation are seen amongst different psychiatric disorders.

Summary

In light of unanimous support linking emotion regulation difficulties with eating, anxiety, and mood psychopathologies, difficulties in emotion regulation have been incorporated into models of specific psychopathologies, including major depressive disorder (e.g., Campbell-Sills & Barlow, 2006; Nolen-Hoeksema et al., 2008), generalized anxiety disorder (e.g., Mennin et al., 2007; Suveg et al., 2010), and eating disorders (e.g., Fairburn et al., 1995; McCarthy, 1990; Polivy & Herman, 2002). Providing the emotion regulation construct is operationalized and measured in the same way, viewing psychiatric disorders within an emotion regulation framework is valuable in that it helps to delineate common mechanisms across psychiatric disorders. This work has been termed “transdiagnostic” and is appealing in that any features found to be common across diverse symptom presentations may be treated using common strategies (Mansell, Harvey, Watkins, & Shafran, 2009). In turn, patients with varying symptomatology could theoretically be treated using the same protocol (Wilamowska, Thompson-Hollands, Fairholme, Ellard, Farchione, & Barlow 2010). Ultimately, further understanding of emotion regulation difficulties in bariatric surgery patients will help to inform

interventions aimed at the treatment of psychopathology, which may improve weight loss and psychosocial outcomes.

Purpose

The first purpose of this study was to assess the prevalence of current and lifetime psychiatric disorders in a sample of Canadian bariatric surgery candidates. As an indicator of clinical significance, associations between psychiatric status and quality of life were assessed. It was hypothesized that bariatric surgery candidates would report significantly worse health-related quality of life than Canadian adult females and males and that patients with a current psychiatric disorder would report significantly worse health-related quality of life than patients without a current psychiatric disorder. The present study addressed previous methodological limitations by recruiting a large sample of consecutively referred bariatric surgery candidates and using a structured diagnostic interview and DSM-IV-TR diagnostic criteria. The psychological assessment was described as a “routine” component of the pre-operative assessment with the purpose of facilitating the patients’ preparedness for surgery. In attempt to increase the accuracy of their self-report, patients were encouraged to respond openly and honestly.

The second purpose of this study was to evaluate associations between difficulties in emotion regulation and psychopathology in bariatric surgery candidates. Specifically, we sought to delineate common and specific emotion regulation difficulties across mood, anxiety, and eating psychodiagnostic categories. These associations were investigated in several ways. First, we examined whether bariatric surgery patients as a group were characterized by difficulties in emotion regulation by comparing their total and subscale scores on the DERS to published non-clinical values. Next, given the well-documented gender differences in adults pursuing bariatric surgery (see Tables 3 and 4) and mixed evidence on whether gender is associated with emotion

regulation (Gratz & Roemer, 2004), total and subscale scores on the DERS were compared for females and males. Based on preliminary associations documented by Gratz and Roemer (2004), it was hypothesized that emotion regulation difficulties would *not* be significantly associated with gender. Next, in bivariate and multivariate analyses, we compared the six dimensions of difficulties in emotion regulation captured by the DERS subscale scores in patients with and without a current² mood, anxiety, or eating disorder, respectively, as assessed by psychodiagnostic interview. It was hypothesized that participants with a current Axis I psychiatric disorder would report greater difficulties in emotion regulation across multiple domains relative to bariatric surgery candidates without a current psychiatric disorder. We further hypothesized that these difficulties in emotion regulation would persist when other psychiatric disorders were controlled for statistically. Finally, in multivariate analysis, we examined whether difficulties in emotion regulation predicted Axis I psychiatric comorbidity with the hypothesis that the DERS subscales would be positively associated with the total number of current Axis I disorders.

² The DERS assesses *current* difficulties in emotion regulation only. Because difficulties in emotion regulation may change over time (e.g., with age, psychiatric treatment, psychotherapy), an individual's current ability to regulate his or her emotions may or may not reflect past status (i.e., depending upon whether emotion regulation has improved, deteriorated, or stayed the same over time). As such, associations between emotion regulation difficulties and diagnostic status were assessed with respect to *current* psychiatric disorder status only.

Method

Participants

Three hundred twenty one consecutively referred candidates for the RYGB surgery at the Toronto Western Hospital (TWH) Bariatric Surgery Program participated in this study. All participants provided written informed consent between June 2010 and January 2012. Six participants declined to have their questionnaire and psychosocial interview data included in the research study. Participants were mostly female (80.1%) and had a mean age of 44.37 years and mean BMI of 49.59 kg/m² (detailed description of sample to follow). In accordance with the NIH Consensus Development Conference Panel's recommendations (1991), to be eligible for surgery, patients must have a BMI > 40 kg/m², or ≥ 35 kg/m² with at least one obesity-related comorbidity such as diabetes mellitus, obstructive sleep apnea, or hypertension. As part of the assessment process, patients referred to the TWH Bariatric Surgery Program were evaluated by a multidisciplinary team of healthcare professionals. Patients first attended an educational group ("orientation class") focusing on the RYGB procedure. As part of their usual care, patients also completed a psychosocial self-report questionnaire package. Next, patients were scheduled for individual assessments with a nurse practitioner, social worker, dietician, and a psychometrist, psychologist or psychiatrist, in turn. Prior to the dietician's assessment, each patient completed a second educational group focusing on nutrition. Surgical candidates who chose to proceed with the pre-surgical assessment process after attending the orientation class, and provided written informed consent to have their interview and self-report data used for research purposes, were included in the study. This study was approved by the institutional Research Ethics Board at Ryerson University and the University Health Network in Toronto, Canada.

Measures

Psychodiagnostic interview. The M.I.N.I. International Neuropsychiatric Interview for ADHD Studies version 6.0 (M.I.N.I. 6.0; Sheehan et al., 1998) is a diagnostic interview that assesses current and lifetime DSM-IV-TR Axis I disorders. Assessors were psychometrists with master's-level training in psychology, psychologists, or psychiatrists. All members of the psychology team received instruction on administration of the M.I.N.I. and psychometrists received weekly supervision from a registered clinical psychologist. The following Axis I psychiatric disorders were assessed: mood (including major depressive disorder, dysthymic disorder, and bipolar I and II disorders), anxiety (including panic disorder with and without agoraphobia, agoraphobia without history of panic disorder, social phobia, obsessive-compulsive disorder, posttraumatic stress disorder, and generalized anxiety disorder), substance use (including alcohol and other drug abuse and dependence disorders), eating (including bulimia nervosa and anorexia nervosa), psychotic disorders (including schizophrenia and schizoaffective disorder), and attention-deficit/hyperactivity disorder. Given the propensity of bariatric patients to display binge eating, the M.I.N.I. was supplemented with a module to specifically assess DSM-IV-TR symptoms of binge eating disorder. Notably, although the DSM-IV-TR eating disorder not otherwise specified diagnosis subsumes a diagnosis of binge eating disorder, we elected to report the prevalence of binge eating disorder independently to demonstrate the number of participants who met full diagnostic criteria for this disorder (see Appendix A for DSM-IV-TR suggested research criteria). "Subsyndromal" symptoms of binge eating disorder (e.g., binge eating behaviour or other aspects of binge eating disorder not meeting full diagnostic criteria) that caused significant distress or impairment were diagnosed as eating disorder not otherwise specified. In addition, information regarding clinical presentation (i.e., the frequency

and duration of psychiatric symptoms, and associated distress and interference) of the aforementioned diagnostic classes was used to diagnose adjustment disorders, and mood, anxiety, eating, and psychotic disorders not otherwise specified. The M.I.N.I. has previously demonstrated acceptable interrater reliability (all kappa values > 0.75 ; Sheehan et al., 1998). The M.I.N.I. has also demonstrated good diagnostic validity, with all kappa values exceeding 0.50 except for current drug dependence, which was 0.43 (Sheehan et al., 1998).

The M.I.N.I. was used to assess whether patients met diagnostic criteria for a current or lifetime psychiatric disorder. “Current” was defined according to DSM-IV-TR diagnostic criteria (see Table 5 for timelines of symptoms). A “lifetime” diagnosis was assigned if the patient had ever met diagnostic criteria for the disorder. We did not assess for past generalized anxiety disorder due to the difficulty in assessing this disorder retrospectively.

Table 5

Axis I Psychiatric Disorders Assessed and 'Current' Time Frame

Psychiatric Disorder	Current time frame
Mood disorders	
Major depressive disorder	Past 2 weeks
Dysthymic disorder	Past 2 years
Bipolar I disorder	Past week
Bipolar II disorder	Past 4 days
Anxiety disorders	
Panic disorder with agoraphobia	Past month
Panic disorder without agoraphobia	Past month
Agoraphobia without history of panic disorder	Past month
Social phobia (social anxiety disorder)	Past month
Obsessive-compulsive disorder	Past month
Posttraumatic stress disorder	Past month
Generalized anxiety disorder	Past 6 months
Eating disorders	
Binge eating disorder	Past 3 months
Bulimia nervosa	Past 3 months
Anorexia nervosa	Not applicable
Substance use disorders	
Substance abuse (non-alcohol)	Past 12 months
Substance dependence (non-alcohol)	Past 12 months
Alcohol abuse	Past 12 months
Alcohol dependence	Past 12 months
Psychotic disorders	
Schizophrenia	Past month
Schizoaffective disorder	Past month
Attention-deficit/hyperactivity disorder	Past 6 months

Emotion regulation. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) is a 36-item measure that assesses global and specific difficulties in emotion regulation. The Nonacceptance of Emotional Responses subscale (NONACCEPTANCE; 6 items) reflects the tendency to have negative secondary emotional reactions (e.g., guilt, shame, embarrassment) to one's negative emotions, or nonacceptance of one's emotional distress. A sample item from the NONACCEPTANCE subscale is, "When I'm upset, I feel guilty for feeling that way." The Difficulties Engaging in Goal-Directed Behaviour subscale (GOALS; 5 items) reflects difficulties engaging in goal-directed behaviour when experiencing negative emotions and contains items like, "When I'm upset, I have difficulty getting work done." The Impulse Control Difficulties subscale (IMPULSE; 6 items) reflects difficulties controlling one's behaviour when experiencing negative emotions. A sample item from the IMPULSE subscale is "When I'm upset, I become out of control." The Lack of Emotional Awareness subscale (AWARENESS; 6 items) reflects difficulties attending to and acknowledging emotions and includes items like, "I pay attention to how I feel" (reverse scored). The Limited Access to Emotion Regulation Strategies subscale (STRATEGIES; 8 items) reflects access to emotion regulation strategies perceived as effective. A sample item from this subscale is, "When I'm upset, I believe that there is nothing I can do to make myself feel better." Finally, the Lack of Emotion Clarity subscale (CLARITY; 5 items) reflects how well an individual understands the emotions he or she is experiencing. A sample item from the CLARITY subscale is, "I have difficulty making sense out of my feelings." On each of the 36 items, participants are asked to rate their responses from 1 (almost never; 0-10%) to 5 (almost always; 91-100%). Responses are coded so that higher scores on each subscale indicate greater difficulties with emotion regulation (i.e., greater emotion dysregulation). The DERS has previously demonstrated acceptable internal

consistency (Cronbach's $\alpha = .93$ for the DERS total score; Cronbach's $\alpha > .80$ for each subscale; Gratz & Roemer, 2004) and construct validity (Gratz & Roemer, 2004). In the present study, Cronbach's α exceeded .70 for the DERS total score ($\alpha = .93$) and NONACCEPTANCE ($\alpha = .90$), GOALS ($\alpha = .82$), IMPULSE ($\alpha = .84$), AWARENESS ($\alpha = .83$), STRATEGIES ($\alpha = .89$), and CLARITY ($\alpha = .77$) subscale scores, demonstrating appropriate internal reliability (Kline, 1999).

Quality of life. The Medical Outcomes Study 36-item Short-Form Health Survey (SF-36; Ware & Sherbourne, 1992) is a 36-item self-report questionnaire that assesses health-related quality of life. Scoring of the SF-36 generates eight subscales: four subscales represent the physical health domain (physical functioning, role limitations because of physical health problems, bodily pain, and general health perceptions) and four represent the mental health domain (role limitations because of emotional problems, vitality [energy/fatigue], general mental health [psychological distress and psychological well-being], and social functioning). Composites of the four physical health domains and four mental health domains may be used to generate the physical component score (PCS) and mental component score (MCS). Responses are coded so that higher scores indicate better health status. The SF-36 has well-established reliability (e.g., Cronbach's $\alpha > .81$ for each scale; Stewart, Hays, & Ware, 1998) and validity, as evidenced by significant correlations with medical and psychiatric symptoms (McHorney, Ware, & Raczek, 1993). In the present study, all eight subscales demonstrated acceptable internal reliability: physical functioning ($\alpha = .89$), role limitations because of physical health problems ($\alpha = .87$), bodily pain ($\alpha = .80$), general health perceptions ($\alpha = .73$), role limitations because of emotional problems ($\alpha = .86$), vitality ($\alpha = .78$), general mental health ($\alpha = .84$), and social functioning ($\alpha = .78$).

Body Mass Index. Body Mass Index was calculated from measures of height and weight that were collected by a bariatric dietician. Body weight, measured with patients in stocking feet and indoor clothing, was measured to the nearest 0.1 kg using a bariatric wheelchair digital scale (Rice Lake Healthweigh SB-1000 Summit™). Height was measured to the nearest 0.1 cm using a stadiometer that was fixed to the wall. Body mass index was calculated as $\text{weight [kg]} / \text{height}^2 \text{ [m]}$.

Sociodemographics. Sociodemographics included participants' sex, age, race/ethnicity, relationship status, number of children, highest level of completed education, and employment status.

Procedure

Psychological assessments occurred between June 2010 and January 2012 and were conducted in-person or by Telehealth (a videoconferencing application that permits real-time, fact-to-face assessment of patients). Psychological assessments took approximately one hour to complete and included a psychodiagnostic interview and review of the patient's sociodemographics. Patients completed the abovementioned 'paper and pencil' self-report measures of emotion regulation difficulties (DERS; Gratz & Roemer, 2004) and functional health status (SF-36; Ware & Sherbourne, 1992) following the orientation class and prior to attending their first individual assessment. Height and weight were measured by a clinic dietician during the nutrition assessment.

Results

Demographic and Clinical Characteristics

Table 6 summarizes the sociodemographic characteristics of the 321 bariatric surgery candidates who participated in this study. The mean age of participants was 44.37 years ($SD = 11.07$ years). The oldest participant was 69 years and the youngest participant was 20 years. Participants were predominantly female (80.1%), Caucasian (81.3%), married (51.1%), and had children (70.4%). Approximately half of the participants had completed a college diploma or university degree (50.5%) and two-thirds were employed in full-time or part-time work (65.4%). The mean BMI of participants was 49.59 kg/m^2 ($SD = 8.91$). The highest BMI was 89.30 and the lowest BMI was 34.00^3 . The mean BMI of males ($M = 52.42$, $SD = 10.90$) was significantly higher than the mean BMI of females ($M = 48.88$, $SD = 8.22$; $t(81.72) = -2.434$, $p = .017$). Ninety-one percent of participants had a BMI over 40, while the remaining 9% had a BMI of 34.00 to 39.99.

³ To be eligible for bariatric surgery, patients must have a $BMI \geq 35 \text{ kg/m}^2$ at the time of referral. In rare circumstances, the patient's BMI has decreased by the time he or she is weighed by the clinic dietician. Two patients in this study had BMIs $< 35 \text{ kg/m}^2$ (34.00 and 34.40, respectively).

Table 6

Sociodemographic Characteristics of Bariatric Surgery Candidates

Characteristic	<i>n</i> (%)
Sex	
Female	257 (80.1)
Male	64 (19.9)
Relationship status	
Married	164 (51.1)
Single, never married	72 (22.4)
Common-law	35 (10.9)
Separated or divorced	42 (13.1)
Widowed	8 (2.5)
Race/Ethnicity	
White (Caucasian)	261 (81.3)
Black (African American)	21 (6.5)
Arab/West Asian	13 (4.0)
Latin American	11 (3.4)
Aboriginal	9 (2.8)
South Asian	3 (0.9)
South East Asian	1 (0.3)
Other	2 (0.6)
Children	
Yes	226 (70.4)
Highest level of education	
Less than high school	48 (15.0)
High school diploma	61 (19.0)
Some college	31 (9.7)
Some university	18 (5.6)
College diploma	94 (29.3)
University degree	68 (21.2)
Not reported	1 (0.3)
Employment Status	
Full-time	184 (57.3)
Disability insurance	55 (17.1)
Part-time	26 (8.1)
Unemployed	26 (8.1)
Retired	22 (6.9)
Social Assistance	8 (2.5)

Prevalence of Axis I Lifetime and Current Psychiatric Disorders

Lifetime prevalence. Table 7 summarizes the prevalence of Axis I disorders. Of the 321 participants, 175 (54.5%) were diagnosed with a lifetime psychiatric disorder: a lifetime mood disorder was most common (37.1%), followed by diagnoses of eating (16.8%), anxiety (13.1%), and substance use (6.9%) disorders. Overall, major depressive disorder was the most prevalent lifetime psychiatric disorder (32.4%). Binge eating disorder was diagnosed in 12.5% of the sample and an additional 4.4% of participants met criteria for eating disorder not otherwise specified. The most frequently diagnosed anxiety disorders were panic disorder with and without agoraphobia (both 4.0%). A substance dependence disorder in sustained full remission was the most common substance use disorder (4.0%): 10 participants were diagnosed with past nicotine dependence; 2 had past cannabis dependence; and 1 had past cocaine dependence. Eleven patients were diagnosed with a lifetime adjustment disorder (3.4%); 3 had lifetime attention-deficit/hyperactivity disorder (0.9%); 2 had a lifetime psychotic disorder (0.6%); and 1 was diagnosed with a lifetime substance abuse disorder (0.3%; amphetamine). The percentage of participants who were diagnosed with 1, 2, or 3 or more lifetime psychiatric disorders was 31.2%, 14.0%, 9.4%, respectively, indicating a high rate of psychiatric comorbidity.

Current prevalence. Fifty-nine participants (18.4%) were diagnosed with a current Axis I disorder: eating disorders were most common (8.4%), followed by anxiety (6.9%) and mood (5.3%) disorders. Binge eating disorder was the most prevalent current psychiatric disorder (7.2%). Two patients were diagnosed with a current adjustment disorder (0.6%); 2 had current attention-deficit/hyperactivity disorder (0.6%); 1 had a current psychotic disorder (0.3%); and 1 had current cannabis dependence (0.3%). The percentage of participants who were diagnosed with 1, 2, or 3 or more current psychiatric disorders was 14.0%, 3.1%, and 1.2%, respectively.

Table 7

Prevalence of Current and Lifetime Axis I Psychiatric Disorders in Bariatric Surgery Candidates

Psychiatric Disorder	Current				Lifetime			
	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*
Any Axis I disorder	59 (18.4)	47 (18.3)	12 (18.8)	1.0	175 (54.5)	147 (57.2)	28 (43.75)	.068
Mood disorders								
Major depressive disorder	11 (3.4)	9 (3.5)	2 (3.1)	1.0	104 (32.4)	90 (35.0)	14 (21.9)	.052
Depressive disorder not otherwise specified	3 (0.9)	3 (1.2)	0 (0)	1.0	6 (1.9)	6 (2.3)	0 (0)	.603
Bipolar I disorder	2 (0.6)	2 (0.8)	0 (0)	1.0	5 (1.6)	5 (1.9)	0 (0)	.587
Bipolar II disorder	1 (0.3)	1 (0.4)	0 (0)	1.0	3 (0.9)	3 (1.2)	0 (0)	1.0
Bipolar disorder not otherwise specified	0 (0)	0 (0)	0 (0)	---	1 (0.3)	1 (0.4)	0 (0)	1.0
Dysthymic disorder	0 (0)	0 (0)	0 (0)	---	2 (0.6)	1 (0.4)	1 (1.6)	.360
Any mood disorder	17 (5.3)	15 (5.8)	2 (3.1)	.540	119 (37.1)	105 (40.9)	14 (21.9)	.006
Anxiety disorders								
Social phobia (social anxiety disorder)	9 (2.8)	8 (3.1)	1 (1.6)	.694	9 (2.8)	8 (3.1)	1 (1.6)	.694
Panic disorder without agoraphobia	4 (1.2)	3 (1.2)	1 (1.6)	1.0	13 (4.0)	12 (4.7)	1 (1.6)	.477
Panic disorder with agoraphobia	3 (0.9)	3 (1.2)	0 (0)	1.0	13 (4.0)	12 (4.7)	1 (1.6)	.477
Agoraphobia without history of panic disorder	3 (0.9)	2 (0.8)	1 (1.6)	.488	3 (0.9)	2 (0.8)	1 (1.6)	.488
Anxiety disorder not otherwise specified	3 (0.9)	3 (1.2)	0 (0)	1.0	4 (1.2)	3 (1.2)	1 (1.6)	1.0
Posttraumatic stress disorder	2 (0.6)	2 (0.8)	0 (0)	1.0	8 (2.5)	8 (3.1)	0 (0)	.365
Generalized anxiety disorder	2 (0.6)	2 (0.8)	0 (0)	1.0	2 (0.6)	2 (0.8)	0 (0)	1.0
Obsessive-compulsive disorder	0 (0)	0 (0)	0 (0)	---	0 (0)	0 (0)	0 (0)	---
Any anxiety disorder	22 (6.9)	19 (7.4)	3 (4.7)	.568	42 (13.1)	37 (14.4)	5 (7.8)	.214

Table 7 (continued)

Prevalence of Current and Lifetime Axis I Psychiatric Disorders in Bariatric Surgery Candidates

Psychiatric Disorder	Current				Lifetime			
	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*
Eating disorders								
Binge eating disorder	23 (7.2)	17 (6.6)	6 (9.4)	.423	40 (12.5)	32 (12.5)	8 (12.5)	.992
Eating disorder not otherwise specified [‡]	4 (1.2)	2 (0.8)	2 (3.1)	.179	14 (4.4)	12 (4.7)	2 (3.1)	.744
Bulimia nervosa	0 (0)	0 (0)	0 (0)	---	0 (0)	0 (0)	0 (0)	---
Anorexia nervosa	0 (0)	0 (0)	0 (0)	---	0 (0)	0 (0)	0 (0)	---
Any eating disorder	27 (8.4)	19 (7.4)	8 (12.5)	.208	54 (16.8)	44 (17.1)	10 (15.6)	.854
Substance use disorders								
Substance dependence (non-alcohol)	1 (0.3)	1 (0.4)	0 (0)	1.0	13 (4.0)	9 (3.5)	4 (6.3)	.300
Substance abuse (non-alcohol)	0 (0)	0 (0)	0 (0)	---	1 (0.3)	1 (0.4)	0 (0)	1.0
Alcohol dependence	0 (0)	0 (0)	0 (0)	---	4 (1.2)	2 (0.8)	2 (3.1)	.179
Alcohol abuse	0 (0)	0 (0)	0 (0)	---	8 (2.5)	5 (1.9)	3 (4.7)	.200
Any substance use disorder	1 (0.3)	1 (0.4)	0 (0)	1.0	22 (6.9)	14 (5.4)	8 (12.5)	.055
Psychotic disorders								
Schizoaffective disorder	1 (0.3)	1 (0.4)	0 (0)	1.0	1 (0.3)	1 (0.4)	0 (0)	1.0
Schizophrenia	0 (0)	0 (0)	0 (0)	---	0 (0)	0 (0)	0 (0)	---
Psychotic disorder not otherwise specified	0 (0)	0 (0)	0 (0)	---	1 (0.3)	1 (0.4)	0 (0)	1.0
Any psychotic disorder	1 (0.3)	1 (0.4)	0 (0)	1.0	2 (0.6)	2 (0.8)	0 (0)	1.0
Adjustment disorder	2 (0.6)	2 (0.8)	0 (0)	1.0	11 (3.4)	10 (3.9)	1 (1.6)	.700
Attention-deficit/hyperactivity disorder	2 (0.6)	2 (0.8)	0 (0)	1.0	3 (0.9)	3 (1.2)	0 (0)	1.0

Table 7 (continued)

Prevalence of Current and Lifetime Axis I Psychiatric Disorders by Gender in Bariatric Surgery Candidates

Psychiatric Disorder	Current				Lifetime			
	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*	All Participants (N = 321)	Females (n = 257)	Males (n = 64)	p*
Total Axis I disorders								
None	262 (81.6)	210 (81.7)	52 (81.3)	1.0	146 (45.5)	110 (42.8)	36 (56.3)	.068
One	45 (14.0)	35 (13.6)	10 (15.6)	.689	100 (31.2)	85 (33.1)	15 (23.4)	.174
Two	10 (3.1)	8 (3.1)	2 (3.1)	1.0	45 (14.0)	35 (13.6)	10 (15.6)	.689
Three or more	4 (1.2)	4 (1.6)	0 (0)	.588	30 (9.4)	27 (10.5)	3 (4.7)	.228

Note. Values are shown as *n* (%). * Statistical tests were conducted with several dependent variables (i.e., females and males were compared on 37 current and 37 lifetime variables), so the α level was adjusted using the Bonferroni procedure to control for familywise error rate. As such, $p \leq .001$ indicated a significant effect. Psychodiagnostic assessments were completed with the M.I.N.I. International Neuropsychiatric Interview for ADHD Studies version 6.0 (Sheehan et al., 1998). Assessments were completed as part of the pre-operative assessment process.

* Males and females were compared using the chi-square statistic or Fisher's exact test was used when expected cell frequencies were less than five.

£ Not including a diagnosis of binge eating disorder.

Factors Associated with Psychiatric Disorders

Next, independent *t*-tests, chi-square analyses, and Fisher's exact test were used to determine whether participants with and without lifetime or current Axis I psychiatric disorders differed by sex, BMI, or quality of life as measured by the SF-36. Because statistical tests were conducted with several dependent variables (i.e., females and males were compared on 37 current and 37 lifetime psychiatric disorders), the α level was adjusted using the Bonferroni procedure to control for familywise error rate (with 37 comparisons, respectively, $p \leq .001$ indicated a significant effect). Results revealed no statistically significant differences in prevalence rates for current psychiatric disorders between females and males. In addition, there were no significant differences in mean BMI between participants with ($M = 49.48$, $SD = 9.17$) and without ($M = 49.70$, $SD = 8.68$) a lifetime Axis I diagnosis ($t(319) = .22$, $p = .825$) or with ($M = 49.26$, $SD = 8.99$) and without ($M = 49.97$, $SD = 8.83$) a current Axis I diagnosis ($t(319) = .71$, $p = .476$).

One-sample *t*-tests with Bonferroni adjusted alpha levels (with 10 comparisons, $p \leq .005$ indicated a significant effect) were used to determine whether participants' scores on the SF-36 were significantly different from normative values. As hypothesized, bariatric surgery candidates scored significantly lower than Canadian females and males on all eight domains of the SF-36 and the physical and mental component summary scales (all $ps < .001$), representing worse physical and mental health status relative to the general adult population (see Table 8). Next, independent *t*-tests with Bonferroni adjusted alpha levels ($p \leq .005$ indicated a significant effect) were used to compare SF-36 functional health status between those with and without a current psychiatric disorder. Compared to those without a current Axis I disorder, participants diagnosed with a current Axis I disorder reported significantly worse functioning on seven of the

eight SF-36 subscales: physical functioning ($p = .002$), bodily pain ($p < .001$), general health perceptions ($p < .001$), role limitations because of emotional problems ($p < .001$), vitality ($p < .001$), general mental health ($p = .002$), and social functioning ($p < .001$). These aforementioned differences represented small-sized effects (r s ranging from .17 to .26; Cohen, 1988, 1992). In addition, as compared to participants without a current Axis I disorder, the mean mental component score was significantly worse in patients with a current Axis I disorder ($p < .001$), which also represented a small-sized effect ($r = .24$). Additional comparisons between those with and without a current Axis I disorder on the SF-36 subscales were not statistically significant. These results are presented in Table 9 and illustrated graphically in Figure 2.

Table 8

Comparisons of Bariatric Surgery Candidates' SF-36 Scores to Canadian Normative Data

Variable	Hopman et al. (2000) (N = 9423)	Current study (N = 321) [‡]	t (320) [‡]	p
Physical functioning	85.8 (20.0)	40.34 (23.76)	-34.28	<.001*
Physical role limitations	82.1 (33.2)	41.59 (41.36)	-17.55	<.001*
Bodily pain	75.6 (23.0)	41.83 (21.15)	-28.61	<.001*
General health perceptions	77.0 (17.7)	37.21 (20.40)	-34.95	<.001*
Emotional role limitations	84.0 (31.7)	63.34 (42.53)	-8.70	<.001*
Vitality	65.8 (18.0)	33.09 (19.72)	-29.67	<.001*
General mental health	77.5 (15.3)	65.01 (20.28)	-11.02	<.001*
Social functioning	86.2 (19.8)	61.21 (28.77)	-15.56	<.001*
Physical component scale	50.5 (9.0)	30.77 (9.97)	-35.40	<.001*
Mental component scale	51.7 (9.1)	46.72 (12.30)	-7.24	<.001*

Note. Values are shown as *M* (*SD*). * $p \leq .005$ indicated a significant effect after Bonferroni correction. SF-36 = Medical Outcomes Study 36-item Short Form (Ware & Sherbourne, 1992). Higher scores on the SF-36 indicate better health-related quality of life.

[‡] $N = 321$ and $df = 320$, except for the mental and physical component scales, and vitality and general mental health subscales, when $N = 320$ and $df = 319$ due to missing data.

Table 9

Associations Between Current Psychiatric Disorder and Health Status in Bariatric Surgery Candidates

Variable	Current Axis I disorder (<i>n</i> = 59)	No Current Axis I disorder (<i>n</i> = 262)*	<i>t</i> (319)*	<i>p</i>
Physical functioning	31.78 (20.04)	42.27 (24.14)	-3.11	.002*
Physical role limitations	32.63 (38.63)	43.61 (41.75)	-1.85	.065
Bodily pain	31.20 (18.11)	44.23 (21.08)	-4.84	<.001*
General health perceptions	29.75 (17.79)	38.89 (20.60)	-4.79	<.001*
Emotional role limitations	43.50 (42.10)	67.81 (41.04)	-4.06	<.001*
Vitality	23.39 (17.46)	35.29 (19.57)	-4.30	<.001*
General mental health	53.97 (21.31)	67.51 (19.22)	3.13	.002
Social functioning	49.15 (26.86)	63.93 (28.54)	-3.63	<.001*
Physical component scale	28.31 (8.42)	31.32 (10.22)	-2.38	.019
Mental component scale	40.25 (12.49)	48.18 (11.80)	-4.45	<.001*

Note. Values are shown as *M* (*SD*). * $p \leq .005$ indicated a significant effect after Bonferroni correction. SF-36 = Medical Outcomes Study 36-item Short Form (Ware & Sherbourne, 1992). Higher scores on the SF-36 indicate better health-related quality of life.

* $n = 262$ and $df = 319$, except for the mental and physical component scales, and vitality and general mental health subscales, when $n = 261$ and $df = 318$ due to missing data.

Figure 1. Associations between current psychiatric disorder and health status in bariatric surgery candidates.
 * $p \leq .005$ indicated a significant effect after Bonferroni correction. Bars represent standard errors of mean.
 Higher scores on the SF-36 indicate better health-related quality of life.

Emotion Regulation

Descriptive statistics for the DERS are presented for the total sample in Table 10 and separately for females and males in Table 11. Independent t -tests comparing mean scores for females and males on the DERS total and subscale scores were not statistically significant (all $ps > .05$), suggesting there were no between-sex differences in emotion regulation difficulties. Pearson correlation coefficients showed that BMI was not significantly related to the DERS total score ($r = .05$) or NON-ACCEPTANCE ($r = .06$), GOALS ($r = -.01$), IMPULSE ($r = .02$), AWARENESS ($r = .09$), STRATEGIES ($r = .01$), or CLARITY ($r = .07$) subscale scores (all $ps > .05$), indicating no significant associations between body mass and emotion regulation difficulties in this sample.

Table 10

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores in Bariatric Surgery Candidates

Variable	<i>M</i>	<i>SD</i>
DERS total	76.35	20.77
NON-ACCEPTANCE	11.82	5.58
GOALS	11.77	4.36
IMPULSE	10.68	4.48
AWARENESS	15.48	5.16
STRATEGIES	15.53	6.51
CLARITY	9.82	3.57

Note. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004).

Next, one-sample t -tests with Bonferroni adjusted alpha levels (with 7 comparisons, $p \leq .007$ indicated a significant effect) were used to determine whether participants' scores on the DERS were significantly different from published values. To our knowledge, however, few studies have examined the DERS in a non-clinical sample. As a result, we compared participants' scores to those published in the original article (Gratz & Roemer, 2004), recognizing that the mean age of the non-clinical sample was significantly younger than our own ($M = 23.10$, range 18-55 years) and that aspects of emotion regulation improve with age (Orgeta, 2009). As Table 11 illustrates, the mean DERS total score for participants was not significantly different from the comparative values. When specific emotion regulation difficulties were examined, both female and male bariatric surgery candidates reported significantly lower scores on the GOALS subscale than adult norms ($ps < .001$). These differences represented large-sized effects for females and males ($r = .52$ and $r = .51$, respectively; Cohen, 1988, 1992) and suggest that bariatric surgery candidates are *better* able to concentrate and accomplish tasks when experiencing negative emotions relative to the participants in Gratz and Roemer's (2004) study. Female participants also had significantly lower scores than the comparative sample on the CLARITY subscale (a small effect: $r = .23$; Cohen, 1988, 1992), but significantly higher scores on the AWARENESS subscale (a small effect: $r = .19$; Cohen, 1988, 1992), suggesting that female bariatric surgery candidates have greater difficulty attending to and acknowledging their emotions, but possess a relative strength in their ability to make sense of the emotions they experience relative to a young adult population. Additional comparisons between participants' scores and Gratz and Roemer's (2004) published values were not statistically significant. Notably, due to the confounding effect of age in these comparisons, the findings should largely be viewed as descriptive and inferential findings should be interpreted with caution.

Table 11

Comparisons of Difficulties in Emotion Regulation Total and Subscale Scores Across Studies and Results of T-tests by Group

Variable	Females				Males			
	Gratz et al. (2004) (<i>n</i> = 260)	Current study (<i>n</i> = 257)	<i>t</i> (256)	<i>p</i>	Gratz et al. (2004) (<i>n</i> = 97)	Current study (<i>n</i> = 64)	<i>t</i> (63)	<i>p</i>
DERS total	77.99 (20.72)	75.85 (20.32)	-1.69	.093	80.66 (18.79)	78.36 (22.54)	-0.82	.417
NON-ACCEPTANCE	11.65 (4.72)	11.75 (5.49)	0.28	.777	11.55 (4.20)	12.09 (5.98)	0.73	.470
GOALS	14.41 (4.95)	11.78 (4.35)	-9.69	<.001*	14.34 (5.16)	11.73 (4.44)	-4.70	<.001*
IMPULSE	10.82 (4.41)	10.51 (4.32)	-1.15	.253	11.55 (4.59)	11.35 (5.04)	-0.32	.754
AWARENESS	14.34 (4.60)	15.30 (4.97)	3.10	.002*	16.26 (4.61)	16.22 (5.88)	-0.06	.955
STRATEGIES	16.16 (6.19)	15.36 (6.32)	-2.04	.043	16.23 (6.26)	16.21 (7.23)	-0.02	.983
CLARITY	10.61 (3.80)	9.80 (3.46)	-3.74	<.001*	10.74 (3.67)	9.88 (4.01)	-1.73	.089

Note. Values are shown as *M* (*SD*). * $p \leq .007$ indicated a significant effect after Bonferroni correction. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

Emotion Regulation and Psychiatric Disorders

The next set of analyses used independent *t*-tests to determine whether difficulties in emotion regulation differed by current Axis I disorder status. It was hypothesized that the presence of a psychiatric disorder would be associated with higher levels of self-reported difficulties in emotion regulation across multiple domains. As each hypothesis was tested with six dependent variables, Bonferroni corrections were used to adjust the alpha level to control for familywise error ($p \leq .007$ indicated a significant effect).

Compared to patients without a current Axis I disorder, participants with *any* current Axis I disorder yielded significantly higher scores on the DERS total score and GOALS, IMPULSE, STRATEGIES, and CLARITY subscales, but not the NON-ACCEPTANCE and AWARENESS subscales after Bonferroni correction (see Table 12). The aforementioned differences represented small-sized effects (*rs* ranging from .19 to .24; Cohen, 1988, 1992). Next, DERS scores were compared between those with and without a current mood disorder. Results revealed that participants with a current mood disorder had significantly higher scores on the DERS total score and GOALS, STRATEGIES, and CLARITY subscales than participants without a current mood disorder, whereas the groups did not differ significantly on the IMPULSE and AWARENESS subscales after Bonferroni correction (see Table 13)⁴. Group

⁴ Because 65% of participants diagnosed with a current mood disorder had a major depressive disorder specifically, we also compared DERS scores between those with and without a current major depressive disorder (i.e., omitting other mood disorders from the analyses) to determine if our results would differ (see Appendix B). Results were largely unchanged. That is, compared to patients without a current major depressive disorder, participants with a current major depressive disorder had significantly higher scores on the DERS total score and GOALS, STRATEGIES, and CLARITY subscales (all $ps < .007$), but not the IMPULSE and AWARENESS subscales. Only one statistically significant difference emerged: participants with a major depressive disorder had higher scores on the NON-ACCEPTANCE subscale than participants who did not have a major depressive disorder ($p < .007$). Overall, whether all mood disorders were included in the analyses, or whether only major depressive disorder was considered, the results were very similar. As such, mood disorders were analysed together in subsequent analyses.

differences did not emerge on the NON-ACCEPTANCE subscale. Each of these differences represented a small-sized effect (r s ranging from .20 to .25; Cohen, 1988, 1992). When anxiety disorder status was considered, participants diagnosed with a current anxiety disorder had significantly higher scores on the GOALS subscale (a small-sized effect: $r = .17$; Cohen, 1988, 1992) than participants who did not have a current anxiety disorder, whereas the groups did not differ significantly on the DERS total score and IMPULSE and CLARITY subscales after Bonferroni correction (see Table 14). There were no group differences on the NON-ACCEPTANCE, AWARENESS, and STRATEGIES subscales. Finally, when current eating disorder status was considered, there were no statistically significant differences after Bonferroni correction on the DERS total or subscale scores (see Table 15).

Table 12

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Axis I Disorder Status

Variable	No current Axis I disorder (<i>n</i> = 262)	Current Axis I disorder (<i>n</i> = 59)	<i>t</i> (319)	<i>p</i>
DERS total	74.01 (19.85)	86.78 (21.75)	4.39	<.001*
NON-ACCEPTANCE	11.45 (5.07)	13.44 (7.28)	1.20	.050
GOALS	11.32 (4.24)	13.76 (4.38)	3.97	<.001*
IMPULSE	10.25 (4.32)	12.59 (4.71)	3.71	<.001*
AWARENESS	15.20 (5.07)	16.75 (5.43)	2.09	.037
STRATEGIES	14.80 (6.04)	18.78 (7.51)	3.81	<.001*
CLARITY	9.50 (3.39)	11.22 (4.03)	3.40	.001*

Note. Values are shown as *M* (*SD*). * $p \leq .007$ indicated a significant effect after Bonferroni correction. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

Table 13

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Mood Disorder Status

Variable	No current mood disorder (<i>n</i> = 304)	Current mood disorder (<i>n</i> = 17)	<i>t</i> (319)	<i>p</i>
DERS total	75.23 (20.27)	96.41 (20.05)	4.20	<.001*
NON-ACCEPTANCE	11.61 (5.38)	15.41 (7.75)	1.99	.063
GOALS	11.52 (4.26)	16.35 (3.53)	4.59	<.001*
IMPULSE	10.53 (4.35)	13.41 (5.86)	2.61	.009
AWARENESS	15.35 (5.16)	17.88 (4.87)	1.98	.049
STRATEGIES	15.21 (6.28)	21.18 (7.96)	3.75	<.001*
CLARITY	9.65 (3.48)	12.76 (4.04)	3.56	<.001*

Note. Values are shown as *M* (*SD*). * $p \leq .007$ indicated a significant effect after Bonferroni correction. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

Table 14

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Anxiety Disorder Status

Variable	No current anxiety disorder (<i>n</i> = 299)	Current anxiety disorder (<i>n</i> = 22)	<i>t</i> (319)	<i>p</i>
DERS total	75.68 (20.72)	85.55 (19.66)	2.16	.031
NON-ACCEPTANCE	11.80 (5.49)	12.05 (6.93)	0.20	.842
GOALS	11.57 (4.33)	14.50 (3.99)	3.08	.002*
IMPULSE	10.53 (4.45)	12.77 (4.39)	2.29	.023
AWARENESS	15.41 (5.17)	16.50 (5.15)	0.96	.339
STRATEGIES	15.34 (6.53)	18.14 (5.74)	1.96	.051
CLARITY	9.70 (3.55)	11.41 (3.47)	2.18	.030

Note. Values are shown as *M* (*SD*). * $p \leq .007$ indicated a significant effect. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

Table 15

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Eating Disorder Status

Variable	No current eating disorder (<i>n</i> = 294)	Current eating disorder (<i>n</i> = 27)	<i>t</i> (319)	<i>p</i>
DERS total	75.75 (21.02)	82.96 (16.79)	1.73	.084
NON-ACCEPTANCE	11.75 (5.60)	12.52 (5.45)	0.68	.495
GOALS	11.69 (4.38)	12.67 (4.15)	1.11	.266
IMPULSE	10.51 (4.44)	12.48 (4.59)	2.20	.029
AWARENESS	15.36 (5.11)	16.78 (5.63)	1.36	.174
STRATEGIES	15.35 (6.47)	17.44 (6.72)	1.60	.110
CLARITY	9.73 (3.51)	10.70 (4.18)	1.35	.177

Note. Values are shown as *M* (*SD*). $P \leq .007$ indicated a significant effect. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

To determine if diagnostic status can be predicted by emotion regulation difficulties, data were analysed using two binary logistic regressions (see Appendix C for tests of logistic regression assumptions and diagnostic statistics). In these analyses, current mood disorder status and current anxiety disorder status (0 = disorder absent; 1 = disorder present) were used, in turn, as the outcome variable. As independent *t*-tests showed that participants with or without a current eating disorder did not differ significantly on emotion regulation difficulties after Bonferroni correction, multivariate analysis was not conducted on this variable.

Given past research indicating comorbidity between mood, anxiety, and eating psychopathology (e.g., Clark & Watson, 1991; Hudson, Hiripi, Pope, & Kessler, 2007), prior to conducting the logistic regressions, we first assessed whether these variables were significantly associated with one another, thereby requiring inclusion as covariates in the regression analyses. As expected, results revealed a statistically significant association between current mood and anxiety disorder status ($\chi^2(1) = 14.31, p = .003$). Current eating disorder status was significantly associated with current anxiety disorder status ($\chi^2(1) = 6.28, p = .028$) but not with current mood disorder status ($\chi^2(1) = 1.99, p = .163$). Thus, when predicting current mood disorder status, a hierarchical logistic regression analysis was performed with current anxiety disorder status as a covariate in the first block. Emotion regulation difficulties that showed significant group differences in bivariate analysis (see Table 13) were entered in the second block. When predicting current anxiety disorder status, current mood and eating disorder status were entered as covariates in the first block, and emotion regulation difficulties that showed significant group differences in bivariate analysis (see Table 14) were entered in the second block. Statistical significance was assessed using the Wald statistic and set at $p < .05$.

In step 1 of the first hierarchical regression analysis, having a current anxiety disorder significantly predicted a current mood disorder diagnosis (model $\chi^2(1) = 8.72, p = .003$). The addition of the emotion regulation variables (GOALS, STRATEGIES, and CLARITY) at step 2 significantly improved the prediction of whether a patient had a current mood disorder (model $\chi^2(4) = 27.33, p < .001$). Overall, the results of the hierarchical regression model showed that the odds of a patient with a current anxiety disorder having a current mood disorder are 4.7 times higher than those of a patient who does not have a current anxiety disorder, adjusting for the aforementioned emotion regulation difficulties. Greater difficulty engaging in goal-directed behaviour when experiencing negative emotions also increased the odds of having a current mood disorder. Specifically, for every one-unit increase on the GOALS subscale of the DERS, the likelihood of having a current mood disorder increased by 1.2, controlling for current anxiety disorder status and other emotion regulation difficulties. To aid in interpreting the odds ratio for the GOALS subscale, consider that scores on this subscale have a range of 20 units. The odds ratio indicates that a one-point increase on this subscale would increase the odds of having a current mood disorder by 1.2. Thus, an increase of 5 units on the GOALS subscale would increase the odds of a current mood disorder by 6 times; a 10-unit increase would increase the odds of a current mood disorder by 12; a 15-unit increase would increase the odds by 18; and a 20-unit increase would increase the odds by 24. Thus, the variable GOALS has a considerable influence on current mood disorder status when measured over the 20-unit range of that subscale. Additional emotion regulation difficulties did not significantly predict whether a patient was diagnosed with a current mood disorder. Thus, as shown in Table 16, the presence of a current anxiety disorder and difficulties engaging in goal-directed behaviour when experiencing negative emotions (GOALS) significantly predicted a current mood disorder.

Table 16

Regression Analysis Predicting Current Mood Disorder Status as a Function of Current Anxiety Disorder Status and Emotion Regulation Difficulties

Predictor Variable	Odds ratio	<i>p</i>	95% Confidence Interval for odds ratio	
			Lower	Upper
Step 1				
Current Anxiety Disorder	4.70	.014*	1.37	16.18
Step 2				
GOALS	1.19	.029*	1.02	1.39
STRATEGIES	1.02	.752	0.92	1.12
CLARITY	1.14	.080	0.99	1.32

Note. Model $\chi^2(4) = 27.33, p < .001$. * $p \leq .05$ indicated a significant effect.

In step 1 of the second hierarchical regression analysis, a current mood disorder and a current eating disorder significantly predicted the presence of a current anxiety disorder (model $\chi^2(2) = 12.34, p = .002$). The addition of the emotion regulation variable GOALS at step 2 significantly improved the prediction of whether a patient had a current anxiety disorder (model $\chi^2(3) = 16.86, p = .001$). Overall, hierarchical regression analysis showed that the odds of a patient with a current mood disorder having a current anxiety disorder are 4.0 times higher than the odds of a patient without a current mood disorder, adjusting for a current eating disorder and emotion regulation difficulties. Moreover, the odds of a patient with a current eating disorder having a current anxiety disorder were 3.16 times higher than those of a patient without a current eating disorder, adjusting for a current mood disorder and emotion regulation difficulties. As in

the previous model predicting current mood disorder status, greater difficulty engaging in goal-directed behaviour when experiencing negative emotions was the only emotion regulation variable that increased the risk of a current anxiety disorder. Specifically, for every one-unit increase on the GOALS subscale, the likelihood of having an anxiety disorder increased by 1.12, controlling for current mood and eating disorder status. Thus, interpreted across the 20-unit range of the GOALS subscale, a 5-unit increase on the GOALS subscale would increase the odds of a current anxiety disorder by 5.6; a 10-unit increase would increase the odds by 11.2; a 15-unit increase would increase the odds by 16.8; and a 20-unit increase would increase the odds by 22.4. Thus, as shown in Table 17, a current mood disorder, current eating disorder, and difficulties engaging in goal-directed behaviour when experiencing negative emotions (GOALS) significantly predicted a current anxiety disorder.

Table 17

Regression Analysis Predicting Current Anxiety Disorder Status as a Function of Current Mood and Eating Disorder Status and Emotion Regulation Difficulties

Predictor Variable	Odds ratio	<i>p</i>	95% Confidence Interval for odds ratio	
			Lower	Upper
Step 1				
Current Mood Disorder	4.00	.030*	1.14	13.99
Current Eating Disorder	3.16	.050*	1.00	10.01
Step 2				
GOALS	1.12	.030*	1.01	1.24

Note. Model $\chi^2(3) = 16.86, p = .001$. * $p \leq .05$ indicated a significant effect.

Finally, a multiple linear regression analysis was conducted to evaluate whether greater difficulties in emotion regulation predicted a greater number of current Axis I disorders (see Appendix D for tests of linear regression assumptions and diagnostic statistics). Regression results are shown in Table 18. Results demonstrated that the combination of the six DERS subscales accounted for ~7.8% of the variance in the total number of current Axis I disorders. Difficulties engaging in goal-directed behaviour when experiencing negative emotions was a significant predictor of the total number of current Axis I disorders, with greater difficulties predicting more current Axis I diagnoses.

Table 18

Regression Analysis Predicting the Total Number of Current Axis I Disorders as a Function of Emotion Regulation Difficulties

Predictor Variable	<i>B</i>	Standard Error <i>B</i>	β	<i>p</i> -value
Constant	-0.22	0.12	---	0.070
NON-ACCEPTANCE	-0.01	0.01	-.10	0.170
GOALS	0.02	0.01	.17	0.026*
IMPULSE	0.01	0.01	.09	0.303
AWARENESS	0.00	0.01	-.04	0.614
STRATEGIES	0.00	0.01	.04	0.647
CLARITY	0.02	0.01	.13	0.082

Note. $R^2 = .078$, $p < .001$. * $p \leq .05$ indicated a significant effect.

Discussion

Prevalence of Axis I Lifetime and Current Psychiatric Disorders

Most bariatric surgery programs require patients to have a pre-operative mental health assessment (Bauchowitz et al., 2005; Devlin et al., 2004; Santry et al., 2006) due to the impact that psychosocial variables may have on post-operative outcome. High rates of psychopathology have indeed been documented in bariatric surgery patients (Kalarchian et al., 2007; Mühlhans et al., 2009; Muri et al., 2008; Rosenberger et al., 2006), although no rigorous study to date has examined the prevalence of psychiatric disorders in a Canadian sample of bariatric patients. Reliable data on the prevalence of psychopathology is a pressing need in clinical research as such information will guide the development and refinement of interventions for bariatric patients. Using a structured psychodiagnostic interview and DSM-IV-TR diagnostic criteria, the first purpose of this study was to investigate the prevalence of psychiatric disorders in 321 bariatric surgery candidates. Our results indicate that the majority of patients (55%) were diagnosed with a lifetime Axis I disorder. A sizeable proportion of those patients (43%) received multiple lifetime psychiatric diagnoses. Approximately 18% of patients had a current Axis I disorder, with 23% of those individuals meeting diagnostic criteria for multiple diagnoses. Mood disorders were the most prevalent lifetime class of psychiatric disorder and eating disorders were the most prevalent class of psychiatric disorder at the time of pre-operative assessment.

Cross study comparisons. As reviewed in the Introduction of this paper, four studies have investigated the prevalence of psychiatric disorders in bariatric surgery candidates using psychodiagnostic interviews and DSM-IV-TR criteria (Kalarchian et al., 2007; Mühlhans et al., 2009; Muri et al., 2008; Rosenberger et al., 2006). Amongst the reviewed studies, estimates of

lifetime and current Axis I disorders ranged from 37-73% and 24-56%, respectively (see Tables 3 and 4). Comparison of our findings with prevalence estimates from other studies should be made cautiously, however, as the disorders assessed across these studies were similar, but not identical. For instance, only Rosenberger et al. (2006) and the current study reported prevalence rates for psychotic disorders and adjustment disorders, whereas it is not clear from other reports whether these disorders were assessed. Somatoform disorders were assessed by Mühlhans et al. (2009) and Rosenberger et al. (2006), but were not assessed in the current study or other studies (Kalarchian et al., 2007; Mauri et al., 2008). Differential assessment of individual disorders across mood, anxiety, eating, and substance use diagnostic categories also occurred. A direct comparison of prevalence rates for diagnostic categories would therefore be misleading. However, if we limit our considerations to comparisons of *single* psychiatric disorders, some interesting trends emerge. First, prior reports indicate that major depressive disorder is consistently diagnosed as the single most common lifetime disorder in bariatric surgery candidates, with estimates ranging from 22 to 55% (Kalarchian et al., 2007; Mühlhans et al., 2009; Muri et al., 2008; Rosenberger et al., 2006). In our study, major depressive disorder was also the most common lifetime psychiatric disorder, diagnosed in 32% of patients. In the current study, binge eating disorder was the most prevalent psychiatric disorder (7%) at the time of pre-operative assessment. In comparison, others have found current rates of binge eating disorder to range from 3 to 23% in pre-operative patients (Kalarchian et al., 2007; Mühlhans et al., 2009; Muri et al., 2008; Rosenberger et al., 2006). The low prevalence of current alcohol and non-alcohol substance use disorders in our sample (0% and 0.4%, respectively) is also in keeping with prior reports indicating that substance use disorders are infrequently diagnosed in pre-operative bariatric surgery patients (estimates of 0 to 0.7% for current alcohol use disorder and 0

to 1.0% for current non-alcohol substance use disorder; Kalarchian et al., 2007; Mühlhans et al., 2009; Mauri et al., 2008; Rosenberger et al., 2006). In terms of these broad comparisons, the trend in results is consistent across studies. Whether specific differences in prevalence rates are due to differences in methodology, site-specific differences in the characteristics of patients presenting for bariatric surgery, or some unknown variable is a matter for further research.

General population comparisons. Amongst three of the four prevalence studies (Kalarchian et al., 2007; Mauri et al., 2008; Mühlhans et al., 2009), rates of psychiatric disorders were elevated in bariatric surgery candidates compared to US, Italian, and German population norms, respectively. One study, conducted by Rosenberger et al. (2006), found prevalence rates of psychiatric disorders that were comparable to US population norms. In comparison, results from this study suggest that certain psychiatric disorders were more common in bariatric surgery candidates, whereas other psychiatric disorders were less common, relative to non-obese individuals and non-treatment-seeking obese individuals in Canada. Specifically, the lifetime prevalence of major depressive disorder in bariatric surgery candidates from our study (32%) was considerably higher than rates reported among obese (16%) and non-obese adults (12%) who were surveyed in the Canadian Community Health Survey (CCHS) - Mental Health and Well-Being (Mather, Cox, Enns, & Sareen, 2009). In contrast, prevalence estimates for a lifetime panic disorder and agoraphobia without history of panic disorder appeared to be similar in our sample of bariatric surgery candidates (4.0% and 0.9%, respectively) and obese (3.7% and 1.5%, respectively) and non-obese (3.7% and 1.0%, respectively) CCHS adults. Lifetime social phobia was least common in bariatric surgery patients (2.8%), followed by non-obese (7.9%) and obese (9.2%) CCHS adults. Finally, when compared to adults from the CCHS, alcohol dependence in the past 12 months was least common in bariatric patients (0%), followed by

obese adults (2.1%), and non-obese adults (2.6%), as was illicit drug dependence (0.3%, 0.3%, and 0.8%, respectively). Additional comparisons of prevalence rates between bariatric surgery candidates and adults from the CCHS could not be made due to differential assessment of psychiatric disorders. In summary, compared to obese and non-obese Canadian adults, descriptive comparisons suggest elevated rates of major depressive disorder, reduced rates of alcohol and non-alcohol substance use disorders, lower rates of social phobia, and comparable rates of panic disorder with agoraphobia and agoraphobia without history of panic disorder in pre-operative bariatric surgery patients.

Interestingly, there is evidence that the prevalence of psychiatric disorders differs between obese adults who seek treatment and those who do not. For instance, in a nationally representative sample of the German adult population, Baumeister and Härter (2007) examined the prevalence of psychiatric disorders in four participant groups: physically healthy, normal weight adults ($N = 495$); overweight adults from the general population ($N = 1550$); obese adults from the general population ($N = 797$); and obese adults who were rehabilitation inpatients with concurrent somatic diseases ($N = 113$). Overall, the lifetime prevalence rates of any psychiatric disorder increased significantly from healthy adults (37.6%) to overweight adults (44.0%) to obese adults (46.0%) to obese inpatients (54.9%). Mood, anxiety, and somatoform disorders were significantly elevated in overweight and obese individuals versus healthy probands, whereas the prevalence of substance use disorders did not differ significantly between the groups. In addition, comorbid psychiatric disorders were significantly more common in overweight and obese participants, compared to healthy probands. Significant associations between obesity and psychopathology, particularly major depressive disorder, have led researchers to speculate that obesity may be of causal importance in the etiology of certain

psychiatric disorders or vice versa, in vulnerable individuals. It is also possible that the two are related to one or more common diatheses. The possibility of causal links between obesity and psychopathology, and the limitations of cross-sectional data in drawing such conclusions, are discussed in the next section.

Factors Associated with Psychiatric Disorders

Sex and BMI. We did not find any significant differences in current or lifetime prevalence rates of psychiatric disorders by sex or BMI, which is in accordance with some studies in bariatric surgery candidates and not with others. Mühlhans et al. (2009) found that females were more likely than males to have a lifetime mood or eating disorder, but significant between-sex differences did not emerge for any individual psychiatric diagnosis. Rosenberger et al. (2006) reported higher rates of current anxiety disorders in females than males, but did not find statistically significant differences across individual anxiety disorders between the sexes. Rosenberger et al. (2006) also found that females were more likely than males to meet diagnostic criteria for a lifetime mood or anxiety disorder, with major depressive disorder diagnosed more often in females. Mauri et al. (2008) found the prevalence of individual psychiatric diagnoses did not differ between males and females or by BMI class. Kalarchian et al. (2007) did not report prevalence rates by sex, but found that patients with a current psychiatric disorder had a significantly higher BMI than those without. In our sample, prevalence rates for a lifetime mood disorder, particularly major depressive disorder, showed a trend towards females having higher prevalence rates than males. Prevalence estimates for a lifetime substance use disorder showed a trend towards males reporting higher prevalence rates than females, which was not statistically significant. These trends in data are in keeping with results from the CCHS, which found that mood disorders were more common in females than males in the general population and

substance use disorders were more common in males than females in the general population (Mather et al., 2009).

Quality of life. In addition to determining lifetime and current prevalence rates of psychiatric disorders, as a marker of clinical significance, a second goal of this study was to examine associations with quality of life. Our results replicate earlier findings by demonstrating that bariatric surgery patients with a current psychiatric disorder have significantly worse quality of life than patients not diagnosed with a psychiatric disorder (Kalarchian et al., 2007; Mauri et al., 2008). This effect was not only found for the mental health aspects of quality of life, but also the majority of physical aspects of quality of life. Similarly, Baumeister and Härter (2007) reported significantly reduced physical and mental health quality of life in obese individuals with at least one psychiatric disorder, as compared to obese individuals without a psychiatric disorder. In line with our hypothesis, we extend prior reports by demonstrating that mean quality of life across all eight physical and mental health domains of the SF-36 was significantly worse in bariatric surgery candidates compared to norms from a Canadian sample of female and male adults. Future examinations may wish to include metrics of general and obesity-specific quality of life (e.g., the Impact of Weight on Quality of Life Questionnaire [IWQOL]; Kolotkin, Crosby, Kosloski, & Williams, 2001) to measure multidimensional changes following bariatric surgery that extend beyond the physical measurements of weight loss. Indeed, as Kolotkin and colleagues (2001) suggest, the data obtained from the IWQOL can provide positive reinforcement to patients, and a performance indicator to healthcare professionals, as it provides information outside weight-specific data (e.g., the impact of obesity on physical function, self-esteem, sexual life, public distress, and work) to assess the *overall* effectiveness of the obesity treatment.

Emotion Regulation and Psychopathology in Bariatric Surgery Candidates

Thus far, our findings suggest that pre-operative Axis I psychiatric disorders warrant attention in bariatric surgery candidates not only because they are relatively common, but because they are associated with significantly worse mental and physical health quality of life. At present, there is limited data on the prognostic significance of pre-operative psychiatric disorders and psychopathology is not a contraindication for surgery per se. What is apparent, however, is that bariatric surgery does not have the same outcome for all patients and this is due in part to psychological factors that may affect the patient's ability to adapt and adhere to the post-operative changes in lifestyle. In recent years, the number of bariatric surgeries performed annually has increased over 14-fold in Canada (Padwal & Lewanczuk, 2005) and over 6-fold in the United States (Steinbrook, 2004). In light of the growing number of individuals who opt for surgical treatment of obesity, there is an increasing need for psychosocial interventions that prepare patients for surgery and support them thereafter (Kalarchian et al., 2007; Mauri et al., 2008). Such interventions would ideally be effective for a range of psychopathologies, tailored to the specific needs of bariatric surgery patients, and feasible for clinicians and patients alike.

As detailed in the Introduction of this paper, a growing body of empirical literature has highlighted commonalities in emotion regulation difficulties in the development and treatment of mood, anxiety, and eating disorders (e.g., Aldao & Nolen-Hoeksema, 2010; Aldao, Nolen-Hoeksema, & Schweizer, 2010). This work has been termed "transdiagnostic" and is intriguing in that mechanisms that are found to be common across diverse symptom presentations could theoretically be targeted using a unified approach rather than disorder-specific protocols (Mansell et al., 2009). In addition, clinicians' time, training demands and associated expenses would be reduced, allowing for greater dissemination of treatment (Wilamowska et al., 2010). In

light of emerging evidence that emotion regulation difficulties may be transdiagnostic factors underlying various types of psychopathology, the second purpose of this study was to examine whether the diverse psychiatric difficulties that bariatric surgery patients may exhibit might have an emotion regulation piece in common. Notably, emotion regulation difficulties have typically been studied in isolation, so as to assess their individual contributions to psychopathology (see Aldao et al., 2010). In addition, most examinations of emotion regulation difficulties have been disorder-specific, thereby limiting tests of transdiagnostic mechanisms that may underlie various forms of psychopathology (see Aldao et al., 2010). The present study sought to address these two prior limitations by examining the specificity of six different emotion regulation difficulties across three psychodiagnostic categories. More specifically, we examined whether difficulties in emotion regulation were ‘common’ determinants of mood, anxiety, and eating disorders and/or ‘specific’ determinants distinguishing one psychodiagnostic category from the other as such information would help guide interventions. Critically, we also tested whether each psychiatric disorder would continue to be associated with emotion regulation difficulties when other psychiatric disorders were taken into account. In this respect, we were able to statistically control for the high comorbidity seen amongst psychiatric disorders, which permitted a better understanding of the unique associations of emotion regulation difficulties with each diagnostic category. Prior to examining associations between emotion regulation difficulties and mood, anxiety, and eating disorders, we examined whether bariatric surgery patients were characterized by difficulties in emotion regulation by comparing their total and subscale scores on the DERS to gender-specific non-clinical values. Our data illustrate that as a group, bariatric surgery candidates reported difficulties in emotion regulation that were fairly comparable to, or better than, the comparative sample of young adults. It should be noted, however, that these findings

are descriptive in nature as prior reports have indicated that emotion regulation improves with age (Orgeta, 2009). As additional studies using the DERS are published, future work will be better able to document how bariatric surgery patients' reported emotion regulation difficulties compare to non-clinical groups.

Emotion regulation and psychiatric disorders. We examined the association between six emotion regulation difficulties (GOALS, IMPULSE, STRATEGIES, CLARITY, NON-ACCEPTANCE and AWARENESS) and three psychodiagnostic categories (mood, anxiety, and eating disorders). We also examined whether greater difficulties in emotion regulation predicted psychiatric comorbidity (i.e., the number of current Axis I disorders, ranging from 0 to 3). Our results showed that the emotion regulation difficulties GOALS, IMPULSE, STRATEGIES, and CLARITY, but not NON-ACCEPTANCE and AWARENESS, predicted a diagnosis of *any* current Axis I disorder after Bonferroni correction. Subsequent multivariate analyses revealed some interesting findings, suggesting that the association between emotion regulation difficulties and psychopathology might vary by symptomatology. Specifically, we found that difficulties engaging in goal-directed behaviour (i.e., difficulty concentrating and accomplishing important tasks) when experiencing negative emotions uniquely predicted a current mood disorder, which is consistent with prior reports (e.g., Ehring et al., 2008; Tull & Gratz, 2008). This finding was robust as it remained significant after Bonferroni correction and current anxiety disorder status was controlled for statistically. Additional emotion regulation variables did not significantly predict whether a patient was diagnosed with a current mood disorder. Participants with a current anxiety disorder also reported experiencing difficulty engaging in goal-directed behaviour when experiencing negative emotions, which remained statistically significant after Bonferroni correction and controlling for the influence of current mood and eating disorder

status. In addition, the GOALS subscale uniquely predicted the total number of current Axis I disorders, with greater difficulties engaging in goal-directed behaviour when experiencing negative emotions predicting a greater number of current Axis I diagnoses. Overall, these findings are consistent with behavioural theories of depression, which posit that the onset and maintenance of depressed mood stems from a lack of positive reinforcement in the environment (Lewinsohn, 1974; Jacobson, Martell, & Dimidgian, 2001). That is, difficulties engaging in goal-directed behaviour when experiencing negative emotions may increase risk for the development and maintenance of depressed mood by limiting the extent to which individuals come into contact with positive-reinforcement. Indeed, behavioural activation, an empirically supported standalone treatment or adjunct to cognitive therapy for depression, begins with a thorough assessment of the client's behavioural goals, which then define the activation assignments. In essence, the client's goals guide the behavioural activation targets, which in turn increase the client's contact with sources of pleasure in the environment. Similarly, anxiety sensitivity (e.g., fear of publically observable anxiety reactions, fear of cardiovascular sensations) has been associated with difficulties engaging in goal-directed behaviour when distressed (Salters-Pedneault et al., 2006), which is consistent with reports that anxiety sensitivity may increase the risk of relying upon maladaptive ways of coping with emotions (e.g., avoidance). Taken together, these preliminary findings suggest that difficulty engaging in goal-directed behaviour may be a common correlate of mood and anxiety psychodiagnostic categories in bariatric surgery candidates, even after other psychopathologies are controlled.

Not all of our hypotheses were supported, however, as difficulties in emotion regulation were not significantly associated with current eating disorder status after Bonferroni correction. This finding was unexpected as binge eating – the form of eating psychopathology most

commonly endorsed by bariatric patients – is often conceptualized as an attempt to regulate or escape from unwanted emotions because more adaptive strategies are ineffective or lacking (Heatherton & Baumeister, 1991; McCarthy, 1990). Nevertheless, this finding is in line with prior reports demonstrating a weaker relationship between emotion regulation difficulties and eating disorder pathology than for depression and anxiety (Aldao et al., 2010; Weinberg & Klonsky, 2009). Although it is premature to draw conclusions between previous findings and the results from this study, a few explanations come to mind. First, although negative affect is a well-established trigger of binge eating, a second notable trigger to binge eating is dietary restriction, which can be physiological or cognitive in nature (Polivy & Herman, 1985). Physiological restriction results from extended (e.g., in the case of chronic dieting) or episodic caloric restriction (e.g., skipping meals) and promotes overeating via hunger. Individuals who endorse cognitive restraint are characterized by attempts to restrict their caloric intake that do not reach actual caloric deprivation and precipitates overeating via cognitive mechanisms (e.g., breaking strict dietary rules can promote disinhibited eating; Polivy & Herman, 1985). These two precursors to overeating (negative affect and dietary restriction) were articulated in Stice's dual-pathway model (1994, 2001), which was subsequently validated in clinical samples of bulimic females, undergraduate students, and more recently in overweight females (e.g., Shepherd, & Ricciardelli, 1998; Stice, 2001; Stice, Shaw, & Nemeroff, 1998; Van Strien, Engels, Van Leeuwe, & Snoek, 2005). At present, less is known about the triggers of binge eating in bariatric surgery patients, but it is possible that episodic physiological restraint (e.g., resultant from skipping meals) or cognitive restraint (i.e., perceived caloric deprivation irrespective of actual dietary intake), is a more potent predictor of binge eating amongst bariatric surgery patients as a group than is psychological distress.

A second explanation for the weaker association between emotion regulation difficulties and eating disorder status is that binge eating, in-and-of-itself, may be emotionally regulating. This hypothesis is in accordance with affect regulation and escape theories (Heatherton & Baumeister, 1991; McCarthy, 1990) and suggests that individuals who binge eat may endorse fewer emotion regulation difficulties simply because binge eating satisfied their emotion regulation needs. Still, we note a trend in our data that individuals with a current eating disorder reported more difficulties regulating their emotions than those without an eating disorder across the six DERS domains. In particular, patients with a current eating disorder reported more difficulty refraining from impulsive behaviour when experiencing negative emotions than patients without an eating disorder, although this difference was not significantly different after Bonferroni correction. Future work should examine the applicability of the dual-pathway model (Stice, 1994, 2001) in bariatric surgery patients and whether binge eating actually does serve to regulate negative emotions (e.g., via comfort or distraction) in bariatric surgery patients. It would also be interesting to examine the interaction of these variables (e.g., is negative affect predictive of overeating independent of dietary restraint or only in the context of dietary restraint?) and how these variables interact with emotion regulation skills and individual differences (e.g., impulse control).

These preliminary findings suggest that mood and anxiety disorders are more closely related to problems in emotion regulation than eating disorders in bariatric surgery candidates. This finding is in accordance with results from a recent meta-analysis, which found that emotion regulation strategies had stronger associations with symptoms of depression and anxiety than to eating disorders (Aldao et al., 2010) and with findings suggesting that internalizing psychiatric symptoms (i.e., depression and anxiety) are more strongly related to emotion regulation than

externalizing disorders (i.e., eating disorders; Garnefski, Kraaij, & van Etten, 2005). Taken together, these findings further implicate the important role of emotion regulation in mood and anxiety disorders and also psychiatric comorbidity. Before discussing the implications of these preliminary findings and directions for future research, the strengths and limitations of this study are discussed in turn below.

Strengths and Limitations

The strengths of this study included the assessment of a broad range of Axis I disorders, including mood, anxiety, eating, substance use, psychotic, and adjustment disorders, and attention-deficit/hyperactivity disorder, using a standardized psychodiagnostic interview procedure, and a large sample of consecutively referred patients. Primarily due to time constraints in the pre-assessment process, we did not assess for Axis II disorders. In a recent study, Mauri et al. (2008) used the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II; First, Gibbon, Spitzer, Williams, & Benjamin, 1997) to assess pre-operative bariatric surgery patients. Results indicated that 19.5% of the sample met diagnostic criteria for a personality disorder, with cluster C (anxious or fearful) traits predominating. In a study by Kalarchian et al. (2007), 29% of pre-operative bariatric surgery patients met diagnostic criteria for an Axis II disorder, as assessed by the SCID-II (First et al., 1997). Again, cluster C personality disorders were most common, with 17% of the sample meeting diagnostic criteria for avoidant personality disorder. Results from these studies suggest that Axis II psychopathology is common among bariatric surgery candidates and suggests the need to examine its impact on post-operative outcomes. For instance, patients with avoidant personality disorder may be less inclined to ask for help from healthcare professionals for fear of being criticized, shamed, or

rejected. Similarly, they may have poorer adherence to appointments. Such associations are worthy of additional study.

Additional strengths of the present study are that all interviewers were clinically experienced psychiatrists, psychologists, or psychometrists who had training and experience in the psychodiagnostic assessment of bariatric surgery patients. In addition, height and weight were measured in our clinic to provide objective measures of BMI and we used well-validated self-reports of quality of life and emotion regulation difficulties.

Impression management. Despite the rigor of our assessment process, it remains possible that our prevalence rates may be biased if patients attempted to minimize their psychiatric symptoms in order to maximize their chance of receiving a positive recommendation from the psychosocial team. Anecdotal reports from bariatric surgery candidates indicate that many are aware (e.g., via online discussion boards, peer support groups, friends or family members) that the absence of an unconditional recommendation for surgery from the psychosocial team may postpone or contraindicate surgery. Accordingly, in a recent study, Ambwani et al. (2011) found that measures of socially desirable responding were inversely correlated with self-reported symptoms of depression and anxiety, but not alcohol-use problems. In addition, Fabricatore, Sarwer, Wadden, Combs, and Krasucki (2007) compared bariatric surgery candidates' self-reported depression scores before their pre-operative psychiatric evaluation and two to four weeks after the evaluation, and found a small but statistically significant increase in depressive symptoms across assessments. Thus, there is some support for impression management in bariatric patients and alternative hypotheses should also be considered. First, as Fabricatore et al. (2007) note in their report, it should be emphasized that the psychometric properties (e.g., construct validity) of the impression management construct

have yet to be demonstrated in bariatric surgery patients and normative responding has not been established. Second, it is equally possible that changes in symptoms between assessments may reflect true symptom change. As Fabricatore et al. (2007) state in their report, due to the impending post-operative lifestyle changes and the possibility of surgical complications, the recommendation to proceed with surgery may represent a stressor for some patients, thereby increasing psychological distress.

In the current study, efforts were made to limit the possibility of socially desirable responding, thereby increasing the likelihood of an accurate assessment. First, as previously detailed, assessments were done face-to-face and many psychiatric disorders (e.g., depression or psychosis) have emotional, cognitive, and behavioural symptomatology that would be difficult to conceal during an in-person interview. Other contraindications, such as purging behaviours or active substance abuse or dependence, are more difficult to detect without patient disclosure. In circumstances where past or present psychopathology is suspected (e.g., due to inconsistent or vague reporting during the psychiatric interview or across interdisciplinary assessments, history of psychiatric treatment, disability insurance related to mental health), collateral information on psychiatric stability was always sought (e.g., by contacting the referring physician or allied healthcare professionals) and additional assessments occurred if needed. Thus, although socially desirable responding remains a possibility, attempts were made to increase the veracity of the assessment process. At present, additional research on the frequency of impression management and the impact this may or may not have on post-operative outcomes is warranted. In the interim, it is important that clinicians take steps to increase the validity of their assessment with the purpose of facilitating patients' preparedness for surgery.

Study sample and generalization of findings. The study sample was mainly composed of middle-aged Caucasian females. Most patients were married and had completed at least some post-secondary education. As such, our findings and conclusions will be most relevant to individuals who fit this profile and the generalizability to other bariatric surgery patients may be limited. It is noteworthy that the sociodemographics of our sample are strikingly similar to the profile of bariatric surgery candidates reported in prior studies from different geographical sites (e.g., Kalarchian et al., 2007), suggesting that our data is a good representation of bariatric surgery candidates in general. However, despite rising rates of obesity and a treatment that has been declared “the most effective therapy available for morbid obesity” (Buchwald, 2005), the homogeneity of this group raises the question of why individuals who would be eligible for bariatric surgery are not pursuing this treatment option. In terms of gender comparisons, high rates of obesity are well-documented in both females and males (WHO, 2011), yet the vast majority of individuals seeking weight loss treatment are females (e.g., Zizza, Herring, Stevens, & Carey, 2003). In a review of the demographic characteristics of 1107 Canadian adults undergoing bariatric surgery in 2002/2003, Padwal (2005) found that 85% of patients were female. Similarly, in their retrospective examination of 87,749 American adults undergoing bariatric surgery, Martin, Beekley, Kjorstad, and Sebesta (2010) found that 81% of the sample was female. In the current study, 80% of the sample was female. Prior research has demonstrated that obesity carries greater stigma for females than males (Brownell, 1991; Lokken, Ferraro, Kirchner, & Bowling, 2003), so it is possible that obese females experience greater distress and would be more motivated to pursue treatment options. Moreover, Grover, Keel, and Mitchell (2003) reported that males tend to regard themselves as “light” regardless of their current body weight, which may account for why males are underrepresented in weight loss

programs. In accordance with this suggestion, our data illustrate that the mean BMI of males seeking bariatric surgery was significantly higher than that of female candidates ($M = 52.42$ vs. $M = 48.88$, respectively), suggesting that males may delay seeking treatment because they are less distressed by, and/or unaware of, their obesity status.

Recently, Afonso, Rosenthal, Li, Zapatier, and Szomstein (2010) interviewed 77 obese adults who were eligible for bariatric surgery and found that 57% of respondents were not interested in a surgical procedure to lose weight. When surveyed about their reasons for not pursuing bariatric surgery, 45% of individuals were concerned about the risk of death and surgical complications, with Latin Americans reporting significantly more concern than other ethnic groups. In addition, only 30% of the patients eligible for bariatric surgery assessed themselves as overweight/obese, which suggests that adults may not pursue a referral for bariatric surgery because they are unaware of their obesity status. Although bariatric surgery is indicated for those with a BMI ≥ 40 kg/m² or a BMI ≥ 35 kg/m² with obesity-related comorbidities (NIH, 1991), our results showed that the mean BMI of participants at the time of referral was 49.59 kg/m², which indeed signifies a delay in referral and/or treatment seeking. In their report, Afonso et al. (2010) also indicate that 30% of primary care physicians did not recommend bariatric surgery. Similarly, other studies have reported that less than half of obese adults are advised to lose weight by their healthcare professional and that middle-aged females with greater levels of education are the cohort most likely to receive advice (Galuska, Will, Serdula, & Ford, 1999). Perlman, Reinhold, and Nadzam (2007) found that the most common reasons that family practitioners did not refer eligible patients for bariatric surgery were concerns about complications and death, belief that the patient would not follow the required post-operative lifestyle changes, and discomfort explaining the gastric bypass procedure to patients.

Interestingly, although recent research has highlighted socioeconomic disparities as a barrier to bariatric surgery, Afonso et al. (2010) found that financial status was not a primary reason for patients to not consider having bariatric surgery. As detailed in the Introduction of this paper, healthcare is publically funded in Canada, so healthcare insurance is not required to qualify for bariatric surgery. Accordingly, in our study, financial limitations did not appear to be a principal barrier for bariatric surgery as almost 30% of the sample was unemployed or receiving financial support from the provincial government (i.e., social assistance or disability insurance). As other investigators have reported, the perceived barriers to bariatric surgery are multifactorial and present among patients and healthcare professionals. Education of both groups on the indications for surgery, as well as the safety and benefit of bariatric surgery is needed, perhaps in the form of community-based educational programs and training directed towards healthcare practitioners.

Cross-sectional data. A final consideration is that our data were cross-sectional in nature, so it is not possible to make inferences about the causal role of obesity in triggering psychiatric disorders or vice versa, or how difficulties in emotion regulation may interact with these variables to cause or exacerbate psychopathology. Some have hypothesized that psychopathology may precipitate the onset of obesity in vulnerable individuals. In support of this contention, in prospective, epidemiological study, Roberts, Kaplan, Shema, and Strawbridge (2000) found that obese adults were significantly more likely to meet DSM-IV diagnostic criteria for depression than normal weight and underweight adults. Moreover, compared to non-obese adults, obese adults who were not depressed at baseline were almost twice as likely to have major depressive disorder one year later after controlling for an array of psychosocial risk factors. In addition, as discussed in this paper, individuals often report overeating in response to

negative emotions (Van Strien, Schippers, & Cox, 1995), which in the absence of more adaptive emotion regulation strategies, could promote weight gain overtime. In accordance with this theory, in a prospective, longitudinal study over 20 years, Hasler et al. (2005) found that depressive symptoms during childhood predicted an increased incidence of adult obesity, which was partially mediated by binge eating after controlling for a variety of covariates (e.g., family history of weight problems, antidepressant use). On the other hand, the stigma of obesity is pervasive (DeJong & Kleck, 1986), which may play a role in the development of psychopathology. Compared with normal-weight individuals, obese individuals are described as “slow,” “lazy,” “self-indulgent,” “stupid,” and “boring” (Greenleaf, Starks, Gomez, Chambliss, & Martin, 2004; Maroney & Golub, 1992; Tiggemann & Anesbury, 2000). There is also compelling evidence of widespread discrimination of the obese (see Puhl & Brownell, 2001 for a review). As one example, Pingitore, Dugoni, Tindale, and Spring (1994) showed participants a series of mock videotaped interviews with professional actors serving as job applicants for computer and sales positions. Bodyweight of the actors was manipulated using theatrical prostheses. Despite having identical qualifications, obese job candidates were less likely to be hired, more likely to be denied promotions, and were paid lower wages for the same job, relative to non-obese individuals. Thus, because obese individuals live in a culture that condemns them for their physical appearance, it is logical that they would experience emotional distress.

The effect of obesity on psychopathology and vice versa is as yet unclear, and the inconsistency of results across studies has led some to claim that obese individuals are not at increased risk for psychopathology. However, Friedman and Brownell (1995) have stated that it is premature to draw this conclusion as the inconsistency in findings may be the by-product of weak methodological studies (e.g., the use of outdated measures, limited range of assessment,

poor representation of segments of the obese population, and inadequate control of sociodemographics variables). Indeed, a reasonable alternative hypothesis of the discrepancy between studies is that obese individuals are varied in terms of psychological functioning (Friedman & Brownell, 1995; Stunkard & Wadden, 1992). The study of psychopathology in obese individuals presenting for treatment provides an opportune avenue of research as this is a group of individuals that is likely distressed by their condition and motivated to receive treatment. Thus, by examining the characteristics of treatment-seeking individuals, including patients presenting for bariatric surgery, it may be possible to isolate risk factors for psychological distress (Friedman & Brownell, 1995). In addition, because not all obese individuals suffer from psychological distress, it may also be possible to identify variables that serve as protective factors. Some logical next steps for future examinations may help elucidate the obesity-psychopathology association. First, future studies should aim to include a variety of control groups (e.g., normal weight, overweight, and obese individuals in the general population; surgical and medical controls) in order to provide reference data against which to compare the characteristics of obese people in treatment. Second, to elucidate whether and why the psychological correlates of obesity vary across individuals, continued study of the moderating variables that may place an individual at risk for psychopathology are warranted. Third, in order to establish causal links of these variables, future research will need to employ prospective, longitudinal studies to examine the onset of psychopathology in psychiatrically healthy individuals with and without obesity at baseline, and vice versa.

Implications, Recommendations, and Directions for Future Research

The prevalence of psychopathology in patients seeking bariatric surgery emphasizes the necessity of routine psychiatric screening and comprehensive assessment when indicated both

before and after surgery. Routine assessment, in turn, would signal the need for intervention to optimize the patient's preparedness for surgery and maximize the likelihood of long-term success. At present, treatment decision-making is complicated, however, because the effect of psychopathology on outcomes after surgery is unclear. In terms of weight loss outcomes, there is evidence that patients with a lifetime Axis I disorder before surgery, particularly disorders of mood and anxiety, lose significantly less weight at six months after surgery than patients who have never been diagnosed with a psychiatric disorder (Kalarchian, Marcus, Levine, Soulakova, Courcoulas, & Wisinski, 2008). One study examined outcomes at ≥ 30 months post-surgery and found less weight loss among patients with a pre-operative Axis I or II disorder (Kinzl et al., 2006). A recent review of 32 studies published between 1995 and 2006 concluded that patients with binge eating behaviour before surgery were more likely to display binge eating behaviour after surgery, and among those who continued to binge, to have less weight loss (Niego, Kofman, Weiss, & Geliebter, 2007). Moreover, recent reports have indicated that disordered eating behaviour pre-surgery (including binge eating and night eating syndromes) predicted eating disturbances two or more years after surgery, but not in the first two post-operative years (Hsu, Sullivan, & Benotti, 1997). This finding underscores the important fact that psychological difficulties may take time to re-emerge after surgery, which stresses the need for long-term follow-up of patients.

Aside from the effects of psychopathology on weight outcomes, pre-existing psychiatric symptoms may place patients at greater risk of psychological complications following bariatric surgery. For instance, pre-operative depression has been associated with suicide after surgery in a small number of patients. Omalu and colleagues (2005) reviewed three cases that had completed suicide following bariatric surgery and showed that each patient had a lifetime

diagnosis of major depressive disorder according to DSM-IV-TR diagnostic criteria.

Interestingly, each patient had lost a significant proportion of their pre-surgery body weight (41%, 40%, and 25%, respectively). As such, Omalu and colleagues (2005) conclude that bariatric surgery patients with a history of depression may require long-term psychiatric treatment to mitigate their risk of suicide after surgery, regardless of successful and sustained weight loss.

Pre- and post-operative assessment. Thus, pre-operative psychopathology has been identified as a predictor of reduced post-surgical weight loss and worse psychological functioning. At present, however, a consensus is lacking regarding the optimal management of bariatric patients who display unstable psychiatric symptoms. Depending on the nature and severity of the presenting symptoms identified in the assessment, suggested interventions have ranged from standalone behavioural strategies to trials of cognitive-behavioural therapy (CBT). Some have emphasized the importance of self-monitoring after surgery (e.g., Sarwer, Dilks, & West-Smith, 2011), to catch problematic eating behaviours and small increases in weight before they become a bigger problem. As Sarwer et al. (2011) aptly state in their review, self-monitoring strategies such as food records and regular weigh-ins are the cornerstone of behaviourally based weight loss programs and may serve an important role for bariatric surgery patients. In the *Preparing for Weight Loss Surgery* workbook, Apple, Lock, and Peebles (2007) recommend weekly weight monitoring on a regular basis to increase patients' awareness of fluctuations in bodyweight over time. The impact of self-monitoring in bariatric surgery patients is as yet unstudied, but may have positive effects on long-term weight management.

Frequency of appointments. A second recommendation has been to increase the frequency of post-surgical assessments to monitor weight loss, eating behaviour, and

psychopathology. This recommendation may be especially important for patients with a history of severe psychopathology or for those who display sub-clinical psychiatric symptoms at the time of pre-operative assessment. The importance of patient-provider contact in supporting weight management was demonstrated in the Weight Loss Maintenance trial (Svetkey et al., 2008). In this randomized control trial, adults who had completed an initial behaviourally-based weight loss program were randomized to 1 of 3 weight-loss maintenance groups: 1) monthly individual contact with an interventionist; 2) unlimited access to an interactive Web site; or 3) a self-directed control group. Although the personal contact and interactive technology groups received similar information (e.g., recommendations to self-monitor, motivational interviewing), at the end of the 30-month follow-up period, those in the personal contact group had regained significantly less weight than those in the other two groups. Such reports provide an empirical foundation for recurrent and long-term post-operative follow-up of bariatric surgery to monitor the development or resurgence of maladaptive behaviours.

Pre- and post-operative intervention. In cases where patients present with clinically significant psychopathology, there is an increasing role for clinicians and researchers to develop and adapt psychological interventions to suit the needs of bariatric patients. To date, no randomized controlled trials of psychotherapy have been conducted amongst bariatric surgery patients. However, in a pre-post intervention design, Ashton, Drerup, Windover, and Heinberg (2009) found that a 4-session pre-operative CBT group led to significant reductions in binge eating behaviours in 243 bariatric surgery patients. A description of session content has been provided by Ashton and colleagues (2009) and includes behavioural (e.g., self-monitoring) and cognitive strategies (e.g., cognitive restructuring), and material that was specific to bariatric patients (e.g., post-operative expectations, communicating with healthcare providers). In a

follow-up study (Ashton, Heinberg, Windover, & Merrell, 2011), a subset of participants ($N = 128$) who completed the CBT trial were categorized as “responders” and “non-responders” based on their post-intervention subjective binge eating episodes and Binge Eating Scale scores (Gormally, Black, Daston, & Rardin, 1982). At 6- and 12-months after surgery, participants classified as responders had lost significantly more of their excess body weight, suggesting that the strategies learned in the brief pre-operative intervention may have improved post-operative eating behaviours and subsequent weight loss.

Leahey, Crowther, and Irwin (2008) developed a 10-session mindfulness-based CBT group intervention for binge eating, which was delivered post-operatively and tailored for bariatric patients (e.g., strategies addressed awareness of physiological hunger and satiety cues, pacing of food consumption, acceptance of post-operative results). The intervention was grounded in cognitive-behavioural principles and supplemented with mindfulness-based strategies that encouraged awareness and acceptance of emotions and physiological cues, and adaptive emotion regulation strategies. The authors note that, given the high rates of depression in bariatric patients, treatment strategies that targeted disordered eating (e.g., cognitive restructuring) were simultaneously applied to depressive symptomatology. Overall, results indicated improvements in binge eating behaviour from pre- to post-treatment, decreases in depression, and improvements in emotion regulation across the six DERS subscales.

At present, it is premature to draw conclusions about the role of emotion regulation difficulties in predicting psychopathology among bariatric surgery patients. However, if additional research supports the finding that specific difficulties in emotion regulation predict current mood and anxiety disorders and psychiatric comorbidity, this would have implications for the development and refinement of psychosocial interventions. Preliminary results from

Ashton and colleague's (2009) and Leahey and colleague's (2008) intervention studies are promising and suggest the feasibility and effectiveness of two brief CBT protocols tailored for bariatric patients. It is particularly notable that Leahey and colleague's (2008) mindfulness-based CBT intervention designed to reduce eating pathology led to a concurrent improvement in depressive symptoms, possibly via improvements in emotion regulation difficulties. Similarly, according to data compiled in a pilot study at the Toronto Western Hospital Bariatric Surgery Program, a six-session CBT intervention for overeating behaviour was effective in reducing eating pathology and improving depressive symptoms (Cassin, Sockalingam, Wnuk, Strimas, Royal, & Parikh, in review). As in Leahey and colleague's (2008) study, Cassin and colleagues (in review) recognized that many of the CBT strategies used to address eating pathology in this protocol (e.g., identifying and challenging counterproductive thoughts, increasing pleasurable activities, problem-solving, self-care) could be applied to concurrent depressive symptoms.

In addition to protocols that principally target disordered eating, given the range of psychopathologies reported by bariatric patients and high levels of comorbid psychopathology, it may also be worthwhile to explore the utility and feasibility of transdiagnostic protocols, which are hypothesized to target common underlying mechanisms across emotional disorders. The *Unified Protocol for Transdiagnostic Treatment of Emotional Disorders*, developed by Barlow et al. (2011), is one CBT approach that aims to address the core features of emotional disorders (defined as all anxiety and unipolar mood disorders). Briefly, the Unified Protocol is comprised of eight modules with five modules specifically designed to target difficulties in emotion regulation (e.g., emotional awareness training, development of adaptive behavioural responses to intense emotions). Overall, the protocol emphasizes the adaptive and functional nature of emotions, promotes tolerance of intense emotions, and seeks to identify and correct an

individual's maladaptive use of emotion regulation strategies (see Wilamowska et al., 2010 for a brief review of the protocol development and treatment components). To date, few studies have examined the effectiveness of the Unified Protocol, although two studies provide evidence of significant reductions in symptom severity for patients' principal psychiatric diagnosis, depression, anxiety, and negative affect, which were maintained at six-month follow-up (Ellard, Fairholme, Boisseau, Farchione, & Barlow, 2010; Farchione, Fairholme, Ellard, Thompson-Hollands, & Barlow, 2010).

As previously noted, the benefit of a transdiagnostic approach is that it is pragmatic and parsimonious: clinicians would need training on one set of therapeutic principles only to address mood and anxiety psychopathology and comorbid presentations, which would increase dissemination of the treatment (Wilamowska et al., 2010). However, there are unique challenges in delivering any psychosocial treatment to bariatric surgery patients, which must be considered. First, in light of the number of program requirements placed on patients (e.g., interdisciplinary assignments, medical examinations, obtaining test results), clinicians will need to consider the additional time commitment and potential burden that completion of a psychosocial treatment would place on patients. In that respect, a consensus will need to be made regarding whether the treatment is mandatory or optional, and whether the treatment is best completed before or after surgery. Second, bariatric surgery patients often travel long distances to their assessment and surgical site(s) (range of 2 to 1734 kilometres, according to data compiled at Toronto Western Hospital) and many have significant issues with mobility, which are practical barriers to treatment. Accordingly, additional modes of therapy, including telephone and online approaches, will need to be considered. Third, as clinicians and researchers have recognized (Ashton et al., 2009; Cassin et al., in review; Leahey et al., 2008), it is of utmost importance that

the intervention concurrently target psychiatric symptoms and provide skills that help patients' prepare for, or adapt and adhere to, the post-operative lifestyle.

Altogether, our findings suggest that further attention to emotion regulation difficulties in bariatric surgery patients might help to inform the development and refinement of psychosocial interventions. Current protocols might benefit from the integration of techniques thought to directly target emotion regulation skills. For instance, as in Leahey and colleague's (2008) study, mindfulness exercises can be a useful tool to increase patients' awareness of emotional responding or maladaptive emotion regulation strategies that are inconsistent with one's goals. Other interventions that address emotion regulation difficulties include dialectical behaviour therapy (Linehan, 1993; Wiser & Telch, 1999) and CBT (Barlow et al., 2004; Fairburn, 2008; Suveg et al., 2006). Unified protocols (e.g., Barlow et al., 2011) that use common therapeutic principles, protocols, and materials to target emotion regulation difficulties across psychiatric disorders may also be a treatment option, but more research is needed to determine if a transdiagnostic approach is feasible and effective.

Conclusions

In summary, the current study provides evidence that psychiatric disorders are prevalent in bariatric surgery patients, are associated with significantly worse quality of life, and have links with specific emotion regulation difficulties. Upon completion of a structured psychodiagnostic interview, roughly 1 in 2 bariatric surgery candidates met diagnostic criteria for a lifetime Axis I disorder and approximately 1 in 5 patients met diagnostic criteria for a current Axis I disorder. When these numbers are interpreted in the context of the growing number of obese individuals, and the increased popularity of bariatric surgery as a treatment option, the potential for psychological problems in surgical candidates is substantial. As discussed in this paper, bariatric

surgery is not contraindicated by psychiatric status per se, but researchers and clinicians alike have affirmed that the development of psychosocial interventions is an essential step to increasing the likelihood of a positive outcome after surgery. This paper concludes by suggesting that emotion regulation difficulties may be one parsimonious treatment target, as a specific difficulty engaging in goal-directed behaviour when experiencing negative emotions was a common and robust predictor of current mood and anxiety disorders, and psychiatric comorbidity. Further examinations are needed to replicate our findings and elucidate how difficulties in emotion regulation interact with psychopathology to affect post-operative outcomes. Altogether, such information represents an important step in determining standalone or adjunct treatment targets by which post-operative outcomes can be improved through psychosocial interventions.

Appendix A

Supplemental Module for the Assessment of Binge Eating Disorder

- 1 a Has there ever been a six month period of time when you had eating binges, or times when you ate a very large amount of food within a 2-hour period? In other words, an amount of food that was definitely larger than most people would eat in a similar period of time in a similar situation. NO YES
- b At that time, how many times per week, on average, did these eating binges occur? (>two days of the week?) NO YES
- 2 a Over the past six months, did you have eating binges, or times when you ate a very large amount of food within a 2-hour period? In other words, an amount of food that is definitely larger than most people would eat in a similar period of time, in a similar situation. NO YES
- b In the last six months, how many times per week, on average, did these eating binges occur? (>two days of the week?) NO YES

		Past 6 Months		Past Episode	
3	a	During these binges, did you feel that you could not stop or control what or how much you ate?		NO	YES
		<p><u>Example:</u> Can you give me an example of what you'd eat in a typical episode? What did you eat the last time this happened? (specify amounts and type of food eaten)</p> <p>During those episodes, did you:</p>		NO	YES
	b	Eat more rapidly than normal?		NO	YES
	c	Eat until you felt uncomfortably full?		NO	YES
	d	Eat when you were not physically hungry?		NO	YES
	e	Eat alone because you felt embarrassed by how much you were eating?		NO	YES
	f	Feel disgusted with yourself, depressed or guilty?		NO	YES

4	At the time you were binge eating, did you feel significant distress about the binge eating?	NO YES	NO YES
---	--	----------	----------

ARE 1 AND 2 AND 3 OR MORE OF 3 CODED YES FOR THAT TIME FRAME?

SPECIFY IF CURRENT AND / PAST

NO	YES
<i>BINGE EATING DISORDER</i>	

ADDITIONAL INFORMATION:

ONSET (year/age) _____

DURATION (years) _____

NUMBER OF DISCRETE EPISODES IN LIFETIME: _____

Appendix B

Means and Standard Deviations for Difficulties in Emotion Regulation Total and Subscale Scores by Current Major Depressive Disorder Status

Variable	No current major depressive disorder (<i>n</i> = 310)	Current major depressive disorder (<i>n</i> = 11)	<i>t</i> (319)	<i>p</i>
DERS total	75.53 (20.47)	99.64 (15.60)	-3.86	<.001*
NON-ACCEPTANCE	11.63 (5.44)	17.00 (7.27)	-3.18	.002*
GOALS	11.58 (4.29)	17.09 (2.74)	-4.22	<.001*
IMPULSE	10.55 (4.36)	14.18 (6.40)	-2.67	.008
AWARENESS	15.41 (5.18)	17.45 (4.55)	1.29	.198
STRATEGIES	15.32 (6.44)	21.36 (5.82)	-3.07	.002*
CLARITY	9.69 (3.52)	13.45 (3.17)	-3.50	.001*

Note. Values are shown as *M* (*SD*). * $p \leq .007$ indicated a significant effect after Bonferroni correction. DERS = Difficulties in Emotion Regulation Scale (Gratz & Roemer, 2004). Higher scores on the DERS indicate more emotion regulation difficulties.

Appendix C

Logistic Regression: Tests of Assumptions and Diagnostic Statistics

Prior to conducting the logistic regression analyses, assumptions regarding multicollinearity and linearity of the logit were examined for each model. Multicollinearity between the predictor variables was assessed according to tolerance and variance inflation factor (VIF) statistics, with tolerance values less than 0.1 (Menard, 1995) and VIF values greater than 10 (Myers, 1990) indicating violations of collinearity. The assumption of linearity was assessed by examining the interaction between each continuous predictor and its log transformation in two logistic regression analyses. Interactions that were statistically significant at $p < .05$ indicated a violation of this assumption (Hosmer & Lemeshow, 1989).

In the model predicting current mood disorder status, tolerance values ranged from .31 to .51 and VIF statistics ranged from 1.97 to 3.22, indicating that assumptions regarding multicollinearity were satisfied. Next, we examined whether the interactions between the GOALS, STRATEGIES, and CLARITY subscales of the DERS and their respective log transformations were significantly associated with current mood disorder status. Results revealed that the three interactions were not statistically significant (all $ps > .05$), indicating that the assumption of linearity of the logit was met. These procedures were repeated for the second regression model predicting current anxiety disorder status. An examination of the collinearity statistics showed that the tolerance value was .51 and VIF statistic was 1.96 for the GOALS subscale, indicating that assumptions regarding multicollinearity were satisfied. Next, we examined whether the interaction between the GOALS subscale and its log transformation was significantly associated with current anxiety disorder status. Results showed that the interaction

was not statistically significant ($p > .05$), indicating that the assumption of linearity of the logit was satisfied.

To test whether each regression model fit the observed data well or was influenced by a small number of cases, we next examined the data for outliers and influential cases. In the model predicting current mood disorder status, 6 cases had standardized residuals above 3.29, suggesting possible outliers. An initial examination of these cases did not reveal errors in data input or scoring. In addition, results of the regression model did not change with or without the outliers present, suggesting the model was not biased by these cases. Examination of the residual statistics (Cook's distance, leverage, and DFBeta values) indicated there were no influential cases having an effect on the model predicting current mood disorder status. Specifically, all 321 cases had Cook's distance values less than 1, DFBetas less than 1, and leverage statistics very close to the expected value of 0.019 for the model.

In the second model predicting current anxiety disorder status, 13 cases had standardized residuals above 3.29, suggesting possible outliers. Inspection of these cases did not show errors in data input or scoring. In addition, results of the regression model did not change with or without the outliers present, suggesting the model was not biased by these cases. Examination of the residual statistics indicated there were no influential cases having an effect on the model. Specifically, all 321 cases had Cook's distance values less than 1, DFBetas less than 1, and leverage statistics very close to the expected value of 0.009 for the model.

In summary, assumptions regarding linearity and the absence of multicollinearity were met, and residual statistics indicated that the regression models fit the observed data well, so we were confident in proceeding with the logistic regression analyses.

Appendix D

Linear Regression: Tests of Assumptions and Diagnostic Statistics

Prior to conducting the linear regression analysis to evaluate whether greater difficulties in emotion regulation predicted a greater number of current Axis I disorders, assumptions regarding multicollinearity and homoscedasticity were examined for the model.

Multicollinearity between the predictor variables was assessed according to bivariate correlation coefficients, and tolerance and VIF statistics, with correlations above .80 or .90 (Field, 2009), tolerance values less than 0.1 (Menard, 1995), and VIF values greater than 10 (Myers, 1990) indicating violations of collinearity. The assumption of homoscedasticity (i.e., that the variance of scores is roughly equal at different points on the predictor variables) was assessed using Levene's test (Levene, 1960), with a statistically significant test ($p < .05$) indicating that the assumption of homogeneity of variance was violated.

Results indicated that none of the DERS subscales correlated above .80 or .90, tolerance values ranged from .31 to .61, and VIF statistics ranged from 1.64 to 3.19, indicating that assumptions regarding multicollinearity were satisfied. Next, the assumption of homogeneity of variance for each of the DERS subscales was examined. Results revealed that Levene's test was not statistically significant (all $ps > .05$), indicating that the assumption of homogeneity of variance was met.

To test whether the linear regression model fit the observed data well or was influenced by a small number of cases, we next examined the data for outliers and influential cases. Results indicated that 1 case had a standardized residual above 3.29, suggesting the presence of an outlier. An initial examination of this case did not reveal errors in data input or scoring. In addition, results of the linear regression model did not change with or without the outlier present,

suggesting the model was not biased by this case. Examination of the residual statistics (Cook's distance, leverage, and DFBeta values) indicated there were no influential cases having an effect on the model. Specifically, all 321 cases had Cook's distance values less than 1, DFBetas less than 1, and leverage statistics very close to the expected value of 0.022 for the model.

In summary, assumptions regarding multicollinearity and homoscedasticity were met, and residual statistics indicated that the regression model fit the observed data well, so we were confident in proceeding with the linear regression analysis.

References

- Afonso, B.B., Rosenthal, R., Li, K.M., Zapatier, J., & Szomstein, S. (2010). Perceived barriers to bariatric surgery among morbidly obese patients. *Surgery for Obesity and Related Diseases*, 6, 16-21. doi:10.1016/j.soard.2009.07.006
- Aldao, A., & Nolen-Hoeksema, S. (2010). Specificity of cognitive emotion regulation strategies: A transdiagnostic examination. *Behaviour Research and Therapy*, 48, 974-983. doi: 10.1016/j.brat.2010.06.002
- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion regulation strategies across psychopathology: a meta-analysis. *Clinical Psychology Review*, 30, 217-237. doi: 10.1016/j.cpr.2009.11.004
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Ambwani, S., Boeka, A.G., Brown, J.D., Byrne, T.K., Budak, A.R., Sarwer, D.B., ... O'Neil, P.M. (2011). Socially desirable responding in bariatric surgery candidates during psychological assessment. *Surgery for Obesity and Related Diseases*. Advance online publication. doi:10.1016/j.soard.2011.06.019
- Apple, R.F., Lock, J., & Peebles, R. (2006). Weighing-in. In D.H. Barlow (Ed.), *Preparing for weight loss surgery*, (pp. 27-35). New York, NY: Oxford University Press, Inc.
- Arterburn, D., & Noel, P.H. (2001). Extracts from "clinical evidence." Obesity. *British Medical Journal*, 322, 1406-1409. doi: 10.1136/bmj.322.7299.1406
- Ashton, K., Drerup, M., Windover, A., & Heinberg, L. (2009). Brief, four-session group CBT reduces binge eating behaviors among bariatric surgery candidates. *Surgery for Obesity and Related Diseases*, 5, 257-262. doi:10.1016/j.soard.2009.01.005

- Ashton, K., Heinberg, L., Windover, A., & Merrell, J. (2011). Positive response to binge eating intervention enhances postoperative weight loss. *Surgery for Obesity and Related Diseases*, 7, 315-320. doi:10.1016/j.soard.2010.12.005
- Barlow, D. H., Allen, L. B., & Choate, M. (2004). Toward a unified treatment for emotional disorders. *Behavior Therapy*, 35, 205-230. doi: 10.1016/S0005-7894(04)80036-4
- Barlow, D. H., Farchione, T. J., Fairholme, C. P., Ellard, K. K., Boisseau, C. L., Allen, L. B., & Ehrenrich-May, J. (2011). *Unified protocol for transdiagnostic treatment of emotional disorders: therapist guide*. New York, NY: Oxford University Press.
- Bauchowitz, A.U., Gonder-Frederick, L.A., Olbrisch, M.E., Azarbad, L., Ryee, M.-Y., Woodson, M., ... Schirmer, B. (2005). Psychosocial evaluation of bariatric surgery candidates: a survey of present practices. *Psychosomatic Medicine*, 67, 825-832. doi: 10.1097/01.psy.0000174173.32271.01
- Baumeister, H., & Härter, M. (2007). Mental disorders in patients with obesity in comparison with healthy probands. *International Journal of Obesity*, 31, 1155-1164. doi: 10.1038/sj.ijo.0803556
- Black, D.W., Goldstein, R.B., & Mason, E.E. (1992). Prevalence of mental disorder in 88 morbidly obese bariatric clinic patients. *American Journal of Psychiatry*, 149(2), 227-234.
- Bocchieri, L.E., Meana, M., & Fisher, B.L. (2002). A review of psychosocial outcomes of surgery for morbid obesity. *Journal of Psychosomatic Research*, 52, 155-165. doi: 10.1016/S0022-3999(01)00241-0
- Brownell, K. D. (1991). Dieting and the search for the perfect body: Where physiology and culture collide. *Behavior Therapy*, 22, 1-12. doi: [http://dx.doi.org/10.1016/S0005-7894\(05\)80239-4](http://dx.doi.org/10.1016/S0005-7894(05)80239-4)

- Buchwald, H. (2005). Bariatric surgery for morbid obesity: health implications for patients, health professionals, and third-party payers. *Journal of the American College of Surgeons*, 200, 593-604. doi:10.1016/j.jamcollsurg.2004.10.039
- Buchwald, H., Avidor, Y., Braunwald, E., Jensen, M.D., Pories, W., Fahrbach, K., & Schoelles, K. (2004). Bariatric surgery: A systematic review and meta-analysis. *Journal of the American Medical Association*, 292, 1724-1737. doi: 10.1016/j.amjmed.2008.09.041
- Campbell-Sills, L., & Barlow, D. H. (2006). Incorporating emotion regulation into conceptualizations and treatments of anxiety and mood disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 542-559). New York, NY: Guilford Press.
- Cassin, S., Sockalingam, S., Wnuk, S., Strimas, R., & Royal, S. (in review). Cognitive behavioural therapy for bariatric surgery patients: protocol development and pilot study.
- Catanzaro, S. J., & Mearns, J. (1990). Measuring generalized expectancies for negative mood regulation: Initial scale development and implications. *Journal of Personality Assessment*, 54, 546-563. doi: 10.1207/s15327752jpa5403&4_11
- Clark, L. A., & Watson, D. (1991). Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology*, 100(3), 316-336.
- Cohen, J. (1988). *Statistical power analysis for the behavioural sciences* (2nd ed.). New York, NY: Academic Press.
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112, 155-159. doi: 10.1037/0033-2909.112.1.155
- Consensus Development Conference Panel (1991). NIH conference. Gastrointestinal surgery for severe obesity. *Annals of Internal Medicine*, 115(12), 956-961.

- DeJong, W., & Kleck, R. (1986). The social psychological effects of overweight. In C. P. Herman, M. P. Zanna, & E. T. Higgins (Eds.), *The Ontario Symposium, Vol. 3: Physical appearance, stigma, and social behavior* (pp. 65-87). Hillsdale, NJ: Erlbaum.
- Derogatis, L. R. (1994). Symptom Checklist-90-R (SCL-90-R): administration, scoring, and procedures manual. Minneapolis, MN: National Computer Systems.
- Devlin, M.J., Goldfein, J.A., Flancbaum, L., Bessler, M., & Eisenstadt, R. (2004). Surgical management of obese patients with eating disorders: a survey of current practice. *Obesity Surgery, 14*, 1252-1257. doi: 10.1381/0960892042386940
- Douketis, J.D., Feightner, J.W., Attia, J., & Feldman, W.F. (1999). Periodic health examination 1999 update: 1. Detection, prevention and treatment of obesity. *Canadian Medical Association Journal, 160*(4), 513-525.
- Ehring, T., Fischer, S., Schnülle, J., Bösterling, A., & Tuschen-Caffier, B. (2008). Characteristics of emotion regulation in recovered depressed versus never depressed individuals. *Personality and Individual Differences, 44*, 1574-1584. doi: 10.1016/j.paid.2008.01.013
- Ellard, K. K., Fairholme, C. P., Boisseau, C. L., Farchione, T. J., & Barlow, D. H. (2010). Unified protocol for the transdiagnostic treatment of emotional disorders: Protocol development and initial outcome data. *Cognitive and Behavioral Practice, 17*, 88-101. doi:10.1016/j.cbpra.2009.06.002
- Fabricatore, A.N., Sarwer, D.B., Wadden, T.A., Combs, C.J., & Krasucki, J.L. (2007). Impression management or real change? Reports of depressive symptoms before and after the preoperative psychological evaluation for bariatric surgery. *Obesity Surgery, 17*, 1213-1219. doi: <http://dx.doi.org/10.1016/j.soard.2010.05.016>

- Fairburn, C.G. (2008). *Cognitive behavior therapy and eating disorders*. New York, NY: Guilford Press.
- Fairburn, C. G., & Bèglin, S. J. (1994). Assessment of eating disorders: interview or self-report questionnaire? *International Journal of Eating Disorders*, 16(4), 363-370.
- Farchione, T. J., Fairholme, C. P., Ellard, K. K., Thompson-Hollands, J., & Barlow, D. H. (2010, November). The unified protocol for the transdiagnostic treatment of emotional disorders: A randomized controlled trial. In K. K. Ellard (Chair), *Conceptualizing, developing, and testing a transdiagnostic approach: The view from the unified protocol*. Symposium conducted at the meeting of the Association of Behavioral and Cognitive Therapies, San Francisco, CA.
- Field, A. (2009). *Discovering statistics using SPSS*. (3rd ed.). London, England: Sage.
- First, M.B., Spitzer, R.L., Gibbon, M., & Williams, J. B.W. (2002). Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition (SCID-I/P). New York, NY: Biometrics Research, New York State Psychiatric Institute.
- First, M.B., Gibbon, M., Spitzer, R.L., Williams, J.B.W., & Benjamin, L.S. (1997). Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II). Washington, DC: American Psychiatric Press, Inc.
- Flegal, K.M., Carroll, M.D., Ogden, C.L., & Johnson, C.L. (2002). Prevalence and trends in obesity among US adults, 1999-2000. *Journal of the American Medical Association*, 288(14), 1723-1727.
- Friedman, M.A., & Brownell, K.D. (1995). Psychological correlates of obesity: Moving to the next research generation. *Psychological Bulletin*, 117, 3-20. doi: 10.1037/0033-2909.117.1.3

- Galuska, D.A., Will, J.C., Serdula, M.K., & Ford, E.S. (1999). Are healthcare professionals advising obese patients to lose weight? *The Journal of the American Medical Association*, 282, 1576-1578. doi:10.1001/jama.282.16.1576
- Garb, J., Welch, G., Zagarins, S., Kuhn, J., & Romanelli, J. (2009). Bariatric surgery for the treatment of morbid obesity: A meta-analysis of weight loss outcomes for laparoscopic adjustable gastric banding and laparoscopic gastric bypass. *Obesity Surgery*, 19, 1447-1455. doi: 10.1007/s11695-009-9927-2
- Garnefski, N., Kraaij, V., & van Etten, M. (2005). Specificity of relations between adolescents' cognitive emotion regulation strategies and internalizing and externalizing psychopathology. *Journal of Adolescence*, 28, 619-631. doi:10.1016/j.adolescence.2004.12.009
- Gormally, J., Black, S., Daston, S., & Rardin, D. (1982). The assessment of binge eating severity among obese persons. *Addictive Behaviors*, 7, 47-55. doi: org/10.1016/0306-4603(82)90024-7
- Gratz, K.L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, 26, 41-54. doi: 10.1007/s10862-008-9102-4
- Greenleaf, C., Starks, M., Gomez, L., Chambliss, H., & Martin, S. (2004). Weight-related words associated with figure silhouettes. *Body Image*, 1, 373-384. doi: 10.1016/j.bodyim.2004.10.004
- Gross, J.J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2, 271-299. doi: 10.1037/1089-2680.2.3.271

- Gross, J. J., & Muñoz, R. F. (1995). Emotion regulation and mental health. *Clinical Psychology: Science and Practice*, 2(2), 151-164.
- Gross, J.J., & Thompson, R.A. (2007). Emotion regulation: Conceptual framework. In J.J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3-24). New York, NY: Guilford Press.
- Grover, V.P., Keel, P.K., & Mitchell, J.P. (2003). Gender differences in implicit weight identity. *International Journal of Eating Disorders*, 34, 125-135. doi: 10.1002/eat.10167
- Harrison, A., Sullivan, S., Tchanturia, K., & Treasure, J. (2010). Emotional functioning in eating disorders: attention bias, emotion recognition and emotion regulation. *Psychological Medicine*, 50, 1887-1897. doi:10.1017/S0033291710000036
- Hasler, G., Pine, D.S., Kleinbaum, D.G., Gamma, A., Luckenbaugh, D., Ajdacic, V., ... Angst, J. (2005). Depressive symptoms during childhood and adult obesity: the Zurich Cohort Study. *Molecular Psychiatry*, 10, 842-850. doi:10.1038/sj.mp.4001671
- Heatherton, T. F., & Baumeister, R. F. (1991). Binge eating as escape from self-awareness. *Psychological Bulletin*, 110, 86-108. doi: 10.1037/0033-2909.110.1.86
- Hopman, W.M., Towheed, T., Anastassiades, T., Tenenhouse, A., Poliquin, S., Berger, C., ... Canadian Multicentre Osteoporosis Study Research Group. (2000). Canadian normative data for the SF-36 health survey. *Canadian Medical Association Journal*, 163(3), 265-271.
- Hosmer, D.W., & Lemeshow, S. (1989). *Applied logistic regression*. New York, NY: Wiley.
- Hsu, L.K.G., Benotti, P.N., Dwyer, J., Roberts, S.B., Saltzman, E., Shikora, S., ... Rand, W. (1998). Nonsurgical factors that influence the outcome of bariatric surgery: A review. *Psychosomatic Medicine*, 60(3), 338-346.

- Hsu, L.K.G., Sullivan, S.P., & Benotti, P.N. (1997). Eating disturbances and outcome of gastric bypass surgery: a pilot study. *International Journal of Eating Disorders*, 21, 385-390. doi: 10.1002/(SICI)1098-108X(1997)
- Hudson, J.I., Hiripi, E., Pope, H.G., Jr. & Kessler, R.C. (2007). The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, 61, 348-358. doi:10.1016/j.biopsych.2006.03.040
- Jacobson, N.S., Martell, C.R., & Dimidjian, S. (2001). Behavioral activation treatment for depression: returning to contextual roots. *Clinical Psychology: Science and Practice*, 8, 255-270. doi: 10.1093/clipsy.8.3.255
- Kalarchian, M.A., Marcus, M.D., Levine, M.D., Courcoulas, A.P., Pilkonis, P.A., Ringham, R.M., ... Rofey, D.L. (2007). Psychiatric disorder among bariatric surgery candidates: relationship to obesity and functional health status. *American Journal of Psychiatry*, 164, 328-334. doi: 10.1176/appi.ajp.164.2.328
- Kalarchian, M.A., Marcus, M.D., Levine, M.D., Soulakova, J.N., Courcoulas, A.P., & Wisinski, M.S.C. (2008). Relationship of psychiatric disorders to 6-month outcomes after gastric bypass. *Surgery for Obesity and Related Diseases*, 4, 544-549. doi: 10.1016/j.soard.2008.03.003
- Kalarchian, M.A., Marcus, M.D., Wilson, G.T., Labouvie, E.W., Brolin, R.E., & LaMarca, L.B. (2002). Binge eating among gastric bypass patients at long-term follow-up. *Obesity Surgery*, 12, 270-275. doi: 10.1381/096089202762552494
- Keltner, D., & Gross, J.J. (1999). Functional accounts of emotions. *Cognition and Emotion*, 13, 467-480. doi: 10.1080/026999399379267

- Kinzl, J.F., Schrattenecker, M., Traweger, C., Mattesich, M., Fiala, M., & Biebl, W. (2006). Psychosocial predictors of weight loss after bariatric surgery. *Obesity Surgery, 16*, 1609-1614. doi: 10.1381/096089206779319301
- Kline, P. (1999). *The handbook of psychological testing* (2nd ed.). London: Routledge.
- Kolotkin, R.L., Crosby, R.D., Kosloski, K.D., & Williams, G.R. (2001). Development of a brief measure to assess quality of life in obesity. *Obesity Research, 9*, 102-111. doi: 10.1038/oby.2001.13
- Kraemer, H.C., Kazdin, A.E., Offord, D.R., Kessler, R.C., Jensen, P.S., & Kupfer, D.J. (1997). Coming to terms with the terms of risk. *Archives of General Psychiatry, 54*(4), 337-343.
- Lavender, J.M., & Anderson, D.A. (2009). Contribution of emotion regulation difficulties to disordered eating and body dissatisfaction in college men. *International Journal of Eating Disorders, 43*, 352-357. doi: 10.1002/eat.20705
- Leahey, T.M., Crowther, J.H., & Irwin, S.R. (2008). A cognitive-behavioral mindfulness group therapy intervention for the treatment of binge eating in bariatric surgery patients. *Cognitive and Behavioral Practice, 15*, 364-375. doi: <http://dx.doi.org/10.1016/j.cbpra.2008.01.004>
- Ledoux, S., Msika, S., Moussa, F., Larger, E., Boudou, P., Salomon, L., ... Clerici, C. (2006). Comparisons of nutritional consequences of conventional therapy of obesity, adjustable gastric banding, and gastric bypass. *Obesity Surgery, 16*, 1041-1049. doi: 10.1381/096089206778026415
- Levene, H. (1960). Robust tests for equality of variances. In I. Olkin, S.G. Ghurye, W. Hoeffding, W.G. Madow, & H.B. Mann (Eds.), *Contributions to probability and statistics:*

Essays in honor of Harold Hotelling (pp. 278-292). Stanford, CA: Stanford University Press.

Lewinsohn, P. (1974). A behavioral approach to depression. In R. J. Friedman, & M. M. Katz (Eds.), *Psychology of depression: Contemporary theory and research* (pp. 157-185). Oxford, England: John Wiley & Sons.

Linehan, M. M. (1993). *Cognitive-behavioral treatment for borderline personality disorder*. New York, NY: Guilford Press.

Lokken, K., Ferraro, F.R., Kirchner, T., & Bowling, M. (2003). Gender differences in body size dissatisfaction among individuals with low, medium, or high levels of body focus. *The Journal of General Psychology*, 13, 305-310. doi: 10.1080/00221300309601161

Mansell, W., Harvey, A., Watkins, E., & Shafran, R. (2009). Conceptual foundations of the transdiagnostic approach to CBT. *Journal of Cognitive Psychotherapy*, 23, 6-19. doi: 10.1891/0889-8391.23.1.6

Maroney, D., & Golub, S. Nurses' attitudes toward obese persons and certain ethnic groups. (1992). *Perceptual Motor Skills*, 75(2), 387-391.

Martin, M., Beekley, A., Kjorstad, R., & Sebesta, J. (2010). Socioeconomic disparities in eligibility and access to bariatric surgery: a national population-based analysis. *Surgery for Obesity and Related Diseases*, 6, 8-15. doi:10.1016/j.soard.2009.07.003

Mather, A.A., Cox, B.J., Enns, M.W., & Sareen, J. (2009). Associations of obesity with psychiatric disorders and suicidal behaviors in a nationally representative sample. *Journal of Psychosomatic Research*, 66, 277-285. doi: 10.1016/j.jpsychores.2008.09.008

- Mauri, M., Rucci, P., Calderone, A., Santini, F., Oppo, A., Romano, A., ... Cassano, G.B. (2008). Axis I and II disorders and quality of life in bariatric surgery candidates. *Journal of Clinical Psychiatry*, 69, 295-301. doi: 10.4088/JCP.v69n0216
- McCarthy, M. (1990). The thin ideal, depression and eating disorders in women. *Behaviour Research and Therapy*, 28, 205-215. doi: 10.1016/0005-7967(90)90003-2
- McHorney, C.A., Ware, J.E. Raczek, A.E. (1993). The MOS 36-item Short Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Medical Care*, 31, 247-263. doi: 10.1097/00005650-199303000-00006
- McTigue, K.M., Harries, R., Hemphill, B., Lux, L., Sutton, S., Bunton, A.J., & Lohr, K.N. (2003). Screening and interventions for obesity in adults: summary of the evidence in the U.S. Preventative Services Task Force. *Annals of Internal Medicine*, 139(11), 933-949.
- Mechanick, J.I., Kushner, R.F., Sugerman, H.J., Gonzalez-Campoy, M., Collazo-Clavell, M.L., Guven, S., ... Dixon, J. (2008). American Association of Clinical Endocrinologists, The Obesity Society, and American Society for Metabolic & Bariatric Surgery medical guidelines for clinical practice for the perioperative nutrition, metabolic, and nonsurgical support of the bariatric surgery patient. *Endocrine Practice*, 14(Suppl. 1), 1-70.
- Menard, S. (1995). *Applied logistic regression analysis*. Sage university paper series on quantitative applications in the social sciences, 7-106. Thousand Oaks, CA: Sage.
- Mennin, D. S., Holoway, R. M., Fresco, D. M., Moore, M. T., & Heimberg, R. G. (2007). Delineating components of emotion and its dysregulation in anxiety and mood psychopathology. *Behavior Therapy*, 38, 284-302. doi: 10.1016/j.beth.2006.09.001

- Micozzi, M.S., Albanes, D., Jones, D.Y., & Chumlea, W.C. (1986). Correlations of body mass indices with weight, stature, and body composition in men and women in NHANES I and II. *American Journal of Clinical Nutrition*, 44(6), 725-731.
- Mineka, S., & Sutton, S.L. (1992). Cognitive biases and the emotional disorders. *Psychological Science*, 3, 65-69. doi: 10.1111/j.1467-9280.1992.tb00260.x
- Mitchell, J.E., Selzer, F., Kalarchian, M.A., Devlin, M.J., Strain, G., Elder, K.A., ... Yanovski, S.Z. (in press). Psychopathology before surgery in the Longitudinal Assessment of Bariatric Surgery-3 (LABS-3) psychosocial study. *Surgery for Obesity and Related Diseases*.
- Mühlhans, B., Horbach, T., & de Zwaan, M. (2009). Psychiatric disorders in bariatric surgery candidates: a review of the literature and results of a German prebariatric surgery sample. *General Hospital Psychiatry*, 31, 414-421. doi: 10.1016/j.genhosppsych.2009.05.004
- Myers, R. (1990). *Classical and modern regression with applications* (2nd ed.). Boston, MA: Duxbury.
- National Heart, Lung, and Blood Institute, and the National Institutes of Health (1998). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The Evidence Report. *Obesity Research*, 6(Suppl. 2), 51S-209S.
- Newman, M. G., Zuellig, A. R., & Kachin, K. E. (2002). Preliminary reliability and validity of the Generalized Anxiety Disorder Questionnaire-IV: A revised self-report diagnostic measure of generalized anxiety disorder. *Behavior Therapy*, 33, 215-233. doi: 10.1016/S0005-7894(02)80026-0

- Niego, S.H., Kofman, M.D., Weiss, J.J., & Geliebter, A. (2007). Binge eating in the bariatric surgery population: A review of the literature. *International Journal of Eating Disorders*, 40, 349-359. doi: 10.1002/eat
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400-424. doi: 10.1111/j.1745-6924.2008.00088.x
- Omalu, B.I., Cho, P., Shakir, A.M., Agumadu, U.H., Rozin, L., Kuller, L.H., & Wecht, C.H. (2005). Suicides following bariatric surgery for the treatment of obesity. *Surgery for Obesity and Related Diseases*, 1, 447-449. doi:10.1016/j.soard.2005.04.003
- Orgeta, V. (2009). Specificity of age differences in emotion regulation. *Aging & Mental Health*, 13, 818-826. doi: 10.1080/13607860902989661
- Padwal, R.S. (2005). Characteristics of patients undergoing bariatric surgery in Canada. *Obesity Research*, 13, 2052-2054. doi: 10.1038/oby.2005.253
- Padwal, R., & Lewanczuk, R.Z. (2005). Trends in bariatric surgery in Canada, 1993–2003. *Canadian Medical Association Journal*, 172(6), 735.
- Perlman, S.E., Reinhold, R.B., & Nadzam, G.S. (2007). How do family practitioners perceive surgery for the morbidly obese? *Surgery for Obesity and Related Diseases*, 3, 428-422. doi:10.1016/j.soard.2006.10.015
- Picot, J., Jones, J., Colquitt, J.L., Gospodarevskaya, E., Loveman, E., Baxter, L., & Clegg, A.J. (2009). The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. *Health Technology Assessment*, 13(41), 1-190, 215-357, iii-iv.

- Pingitore, R., Dugoni, R., Tindale, S., & Spring, B. (1994). Bias against overweight job applicants in a simulated employment interview. *Journal of Applied Psychology, 79*, 909-917. doi: 10.1037/0021-9010.79.6.909
- Polivy, J., & Herman, C.P. (1985). Dieting and bingeing: A causal analysis. *American Psychologist, 40*, 193-201. doi: <http://dx.doi.org/10.1037/0003-066X.40.2.193>
- Polivy, J., & Herman, C. P. (1993). Etiology of binge eating: Psychological mechanisms. In C. G. Fairburn & G. T. Wilson (Eds.), *Binge eating: Nature, assessment and treatment* (pp. 173-205). New York, NY: Guilford Press.
- Polivy, J., & Herman, C. P. (2002). Causes of eating disorders. *Annual Review of Psychology, 53*, 187-213.
- Puhl, R. & Brownell, K.D. (2001). Bias, discrimination, and obesity. *Obesity Research, 9*, 788-805. doi: 10.1038/oby.2001.108
- Roberts, R.E., Kaplan, G.A., Shema, S.J., & Strawbridge, W.J. (2000). Are the obese at greater risk for depression? *American Journal of Epidemiology, 152*, 163-170. doi: 10.1093/aje/152.2.163
- Rosenberger, P.H., Henderson, K.E., & Grilo, C.M. (2006). Psychiatric disorder comorbidity and association with eating disorders in bariatric surgery patients: A cross-sectional study using structured interview-based diagnosis. *Journal of Clinical Psychiatry, 67*, 1080-1085. doi: 10.4088/JCP.v67n0710
- Rosik, C.H. (2005). Psychiatric symptoms among prospective bariatric surgery patients: Rates of prevalence and their relation to social desirability, pursuit of surgery, and follow-up attendance. *Obesity Surgery, 15*, 677-683. doi: 10.1381/0960892053923815

- Salehi, M., Prigeon, R.L., & D'Alessio, D.A. (2011). Gastric bypass surgery enhances glucagon-like Peptide 1-stimulated postprandial insulin secretion in humans. *Diabetes*, 60 (9), 2308-14.
- Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity and repair: Exploring emotional intelligence using the trait meta-mood scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125-154). Washington, DC: APA Books.
- Salters-Pedneault, K., Roemer, L., Tull, M.T., Rucker, L., & Mennin, D.S. (2006). Evidence of broad deficits in emotion regulation associated with chronic worry and generalized anxiety disorder. *Cognitive Therapy and Research*, 30, 469-480. doi: 10.1007/s10608-006-9055-4
- Santry, H.P., Chin, M.H., Cagney, K.A., Alverdy, J.C., & Lauderdale, D.S. (2006). The use of multidisciplinary teams to evaluate bariatric surgery patients: results from a national survey in the U.S.A. *Obesity Surgery*, 16, 59-66. doi: 10.1381/096089206775222096
- Sarwer, D.B., Cohn, N.I., Gibbons, L.M., Magee, L., Crerand, C.E., Raper, S.E., ... Wadden, T.A. (2004). Psychiatric diagnoses and psychiatric treatment among bariatric surgery candidates. *Obesity Surgery*, 14, 1148-1156. doi: 10.1381/0960892042386922
- Sarwer, D.B., Dilks, R.J., & West-Smith, L. (2011). Dietary intake and eating behavior after bariatric surgery: threats to weight loss maintenance and strategies for success. *Surgery for Obesity and Related Diseases*, 7, 644-651. doi:10.1016/j.soard.2011.06.016
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York, NY: Guilford Press.
- Sheehan, D.V., Lecrubier, Y., Harnett-Sheehan, K., Amorim, P., Janavs, J., Weiller, E., ... Dunbar. (1998). The Mini International Neuropsychiatric Interview (M.I.N.I.): The

- development and validation of a structured diagnostic psychiatric interview. *Journal of Clinical Psychiatry*, 59(Suppl. 20), 22-33.
- Shepherd, H., & Ricciardelli, L.A. (1998). Test of Stice's dual pathway model: Dietary restraint and negative affect as mediators of bulimic behaviour. *Behaviour Research and Therapy*, 36, 345-352. doi: [http://dx.doi.org/10.1016/S0005-7967\(98\)00033-3](http://dx.doi.org/10.1016/S0005-7967(98)00033-3)
- Sjöström, L. (2000). Surgical intervention as a strategy for treatment of obesity. *Endocrine*, 13, 213-230. doi: 10.1385/ENDO:13:2:213
- Sjöström, C.D., Lissner, L., Wedel, H., & Sjöström, L. (1999). Reduction in incidence of diabetes, hypertension and lipid disturbances after intentional weight loss induced by bariatric surgery: the SOS Intervention Study. *Obesity Research*, 7(5), 477-484.
- Sjöström, L., Narbro, K., Sjöström, C.D., Karason, K., Larsson, B., Wedel, H., ... Carlsson, L.M.S. (2007). Effects of bariatric surgery on mortality in Swedish obese subjects. *New England Journal of Medicine*, 357, 741-742. doi: 10.1056/NEJMoa066254
- Sockalingam, S., Hawa, R., Wnuk, S., Strimas, R., & Kennedy, S. (2011). Weight loss following roux-en-y gastric bypass surgery: A systematic review of psychosocial predictors. *Current Psychiatry Review*, 7, 226-233. doi: 10.2174/157340011797183139
- Steinbrook, R. (2004). Surgery for severe obesity. *New England Journal of Medicine*, 350(11), 1075-1079.
- Stewart, A.L., Hays, R.D., & Ware, J.E., Jr. (1988). The MOS Short-Form General Health Survey: Reliability and validity in a patient population. *Medical Care*, 26, 724-735. doi: 10.1097/00005650-198807000-00007

- Stice, E. (1994). Review of the evidence for a sociocultural model of bulimia nervosa and an exploration of the mechanisms of action. *Clinical Psychology Review, 14*, 633-661. doi: [http://dx.doi.org/10.1016/0272-7358\(94\)90002-7](http://dx.doi.org/10.1016/0272-7358(94)90002-7)
- Stice, E. (2001). A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect. *Journal of Abnormal Psychology, 110*, 124-135. doi: 10.1037/0021-843X.110.1.124
- Stice, E., Shaw, H., & Nemeroff, C. (1998). Dual pathway model of bulimia nervosa: Longitudinal support for dietary restraint and affect regulation mechanisms. *Journal of Social and Clinical Psychology, 17*, 129-149. doi: <http://dx.doi.org/10.1521/jscp.1998.17.2.129>
- Stice, E., Telch, C. F., & Rizvi, S. L. (2000). Development and validation of the Eating Disorder Diagnostic Scale: A brief self-report measure of anorexia, bulimia, and binge eating disorder. *Psychological Assessment, 12*, 123-131. doi: 10.1037/1040-3590.12.2.123
- Stunkard, A. J., & Wadden, T. A. (1992). Psychological aspects of severe obesity. *American Journal of Clinical Nutrition, 55* (52), 524S-532S.
- Sturm, R. (2003). Increases in clinically severe obesity in the United States, 1986-2000. *Archives of Internal Medicine, 163*(18), 2146-2148.
- Sugerman, H.J., Londrey, G.L., Kellum, J.M., Wolf, L., Liska, T., Engle, K.M., ... Starkey, J.V. (1989). Weight loss with vertical banded gastroplasty and Roux-Y gastric bypass with selective versus random assignment. *American Journal of Surgery, 157*, 93-102. doi: 10.1016/0002-9610(89)90427-3

- Suveg, C., Morelen, D., Brewer, G.A., & Thomassin, K. (2010). The emotion dysregulation model of anxiety: a preliminary path analytic examination. *Journal of Anxiety Disorders*, 24, 924-930. doi:10.1016/j.janxdis.2010.06.018
- Svetkey, L.P., Stevens, V.J., Brantley, P.J., Appel, L.J., Hollis, J.F., Loria, C.M., ... Aicher, K. (2008). Comparison of strategies for sustaining weight loss: the weight loss maintenance randomized controlled trial. *The Journal of the American Medical Association*, 299, 1139-1148. doi: 10.1001/jama.299.10.1139
- Taylor, V.H., Stonehocker, B., Steele, M., & Sharma, A.M. (2012). An overview of treatments for obesity in a population with mental illness. *Canadian Journal of Psychiatry*, 57(1), 13-20.
- Tice, J.A., Karliner, L., Walsh, J., Petersen, A.J., Feldman, M.D. (2008). Gastric banding or bypass? A systematic review comparing the two most popular bariatric procedures. *American Journal of Medicine*, 121, 885-893. doi: 10.1016/j.amjmed.2008.05.036
- Tiggemann, M. & Anesbury, T. (2000). Negative stereotyping of obesity in children: The role of controllability beliefs. *Journal of Applied Social Psychology*, 30, 1977-1993. doi: 10.1111/j.1559-1816.2000.tb02477.x
- Tull, M.T., & Gratz, K.L. (2008). Further examination of the relationship between anxiety sensitivity and depression: The mediating role of experiential avoidance and difficulties engaging in goal-directed behaviour when distressed. *Journal of Anxiety Disorders*, 22, 199-210. doi: doi:10.1016/j.janxdis.2007.03.005
- Van Strien, T., Engels, R.C., Van Leeuwe, J., & Snoek, H.M. (2005). The Stice model of overeating: Tests in clinical and non-clinical samples. *Appetite*, 45, 205-213. doi: <http://dx.doi.org/10.1016/j.appet.2005.08.004>

- Van Strien, T., Schippers, G.M., & Cox, W.M. (1995). On the relationship between emotional and external eating behavior. *Addictive Behaviors*, 20, 585-594. doi: 10.1016/0306-4603(95)00018-8
- Waller, G. (2000). Mechanisms underlying binge eating. *European Eating Disorders Review*, 8, 347-350. doi: 10.1002/1099-0968(200010)8:5<347::AID-ERV381>3.0.CO;2-P
- Ware, J.E., Jr., & Sherbourne, C.D. (1992). The MOS 36-item Short-Form Health Survey (SF-36): I. Conceptual framework and item selection. *Medical Care*, 30(6), 473-83.
- Watson, D. (2005). Rethinking the mood and anxiety disorders: A quantitative hierarchical model for DSM-V. *Journal of Abnormal Psychology*, 114, 522-536. doi: 10.1037/0021-843X.114.4.522
- Weinberg, A., & Klonsky, E.D. (2009). Measurement of emotion dysregulation in adolescents. *Psychological Assessment*, 21, 616-621. doi: 10.1037/a0016669
- Werner, K., & Gross, J.J. (2010). Emotion regulation and psychopathology: a conceptual framework. In A.M. Kring & D.M. Sloan (Eds.), *Emotion regulation and psychopathology* (pp. 13-37). New York, NY: Guilford Press.
- Whiteside, U., Chen, E., Neighbors, C., Hunter, D., Lo, T., & Larimer, M. (2007). Difficulties regulating emotions: Do binge eaters have fewer strategies to modulate and tolerate negative affect? *Eating Behaviors*, 8, 162-169. doi:10.1016/j.eatbeh.2006.04.001
- Wilamowska, Z. A., Thompson-Hollands, J., Fairholme, C. P., Ellard, K. K., Farchione, T. J., & Barlow, D. H. (2010). Conceptual background, development, and preliminary data from the unified protocol for transdiagnostic treatment of emotional disorders. *Depression and Anxiety*, 27, 882-890. doi:10.1002/da.20735

- Wiser, S., & Telch, C.F. (1999). Dialectical behavior therapy for binge-eating disorder. *Journal of Clinical Psychology*, 55, 755-768. doi: 10.1037/0022-006X.69.6.1061
- World Health Organization. (1998). *Obesity: Preventing and Managing the Global epidemic: Report of a WHO Consultation on Obesity* (WHO/NUT/NCD/97.2). Geneva: World Health Organization.
- World Health Organization. (2010a). *Obesity*. Retrieved September 8, 2010, from www.who.int/topics/obesity/en/
- World Health Organization. (2010b). *Obesity and overweight*. Retrieved September 8, 2010, from www.who.int/dietphysicalactivity/publications/facts/obesity/en
- World Health Organization. (2011). *WHO global infobase*. Retrieved July 24, 2012 from <https://apps.who.int/infobase/Indicators.aspx>
- Zizza, C.A., Herring, A.H., Stevens, J., & Carey, T.S. (2003). Bariatric surgeries in North Carolina, 1990 to 2001: a gender comparison. *Obesity Research*, 11, 1519-1525. doi: 10.1038/oby.2003.203