DEPRESSIVE SYMPTOMS, ATTACHMENT AND HEALTH CARE
UTILIZATION AND COST AMONG OBESE WOMEN WITH BINGE EATING
DISORDER UNDERGOING PSYCHOTHERAPY

by

Renee Grenon
(Bachelor of Arts Honours, Laurentian University, 2008)

A thesis submitted to the Faculty of Graduate and Postdoctoral Affairs
in partial fulfillment of the requirements for the degree of

Master of Arts

in

Psychology

Carleton University
Ottawa, Canada

©2011 Renee Grenon

Library and Archives
Canada

Published Heritage
Branch

395 Wellington Street
Ottawa ON K1A 0N4
Canada

Bibliothèque et
Archives Canada

Direction du
Patrimoine de l'édition

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file *Votre référence*
ISBN: 978-0-494-81630-1
Our file *Notre référence*
ISBN: 978-0-494-81630-1

NOTICE:

The author has granted a non-exclusive license allowing Library and Archives Canada to reproduce, publish, archive, preserve, conserve, communicate to the public by telecommunication or on the Internet, loan, distribute and sell theses worldwide, for commercial or non-commercial purposes, in microform, paper, electronic and/or any other formats.

The author retains copyright ownership and moral rights in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

AVIS:

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque et Archives Canada de reproduire, publier, archiver, sauvegarder, conserver, transmettre au public par télécommunication ou par l'Internet, prêter, distribuer et vendre des thèses partout dans le monde, à des fins commerciales ou autres, sur support microforme, papier, électronique et/ou autres formats.

L'auteur conserve la propriété du droit d'auteur et des droits moraux qui protègent cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

In compliance with the Canadian Privacy Act some supporting forms may have been removed from this thesis.

While these forms may be included in the document page count, their removal does not represent any loss of content from the thesis.

Conformément à la loi canadienne sur la protection de la vie privée, quelques formulaires secondaires ont été enlevés de cette thèse.

Bien que ces formulaires aient inclus dans la pagination, il n'y aura aucun contenu manquant.

Canada

Abstract

Depression is a burdensome illness, with personal and societal costs surpassing those of any other illness. Depression and obesity are common in women with Binge Eating Disorder (BED). The current study examined the relationships between depressive symptoms, attachment, health related quality of life (HRQOL), and health care utilization and costs among 105 obese women with BED undergoing psychotherapy. Participants completed measures at pre-treatment, post-treatment and a six month follow-up. Participants were obese (BMI: $M = 38.20$, $SD = 6.80$), and 67.27% had a lifetime history of depression. Participants with BED had higher health care costs and lower HRQOL than published age and sex matched norms. Depressive symptoms and experiences were related to greater medication use (excluding anti-depressants) and lower HRQOL at pre-treatment. Depressive symptoms decreased and HRQOL increased from pre-treatment to six months post-treatment. Results suggest group psychotherapy targeting depressive symptoms may reduce personal burdens and medication use in women with BED.

Acknowledgements

First and foremost I would like to thank Dr. Giorgio Tasca and Dr. Mary Gick for providing me with the opportunity to further my studies. I would like to acknowledge Dr. Tasca for his incredible support and patience to walk me through this work. He took the time to educate me on Hierarchical Linear Modeling, an analysis I would have never been exposed to if it were not for him. Your valuable contributions will always be treasured. To Cathy Sawyer, you were always there when I needed someone to confide in, whether it was on the phone from Sudbury or during your many weekend visits. I would like to acknowledge the members of staff in the Psychology Department at Carleton University and at The Regional Centre for the Treatment of Eating Disorders for your all the help you have provided me in the past two years. Particular acknowledgement goes to my colleagues; Rikki Sewell, Chantal Hermann, and Hilary Maxwell. You all encouraged and instilled confidence in me. I am so thankful to have gained three lifelong friends. I also want to thank my family, my Mom Sue, my Dad Randy and my wonderful sister Liza and brother Jesse, I thank you all for your relentless support and understanding throughout this endeavor.

Table of Contents

Title Page.....	i
Abstract.....	ii
Acknowledgments.....	iii
Table of Contents.....	iv
Tables and Appendices.....	v
Introduction	1
Depression and Health Care Utilization.....	2
Obesity and Health Care Utilization.....	4
Binge Eating Disorder.....	6
Psychological Treatment of BED.....	9
Attachment Theory.....	10
Attachment Style and GPIP Outcome.....	13
Attachment Dimension and Health Care Utilization.....	14
The Present Study.....	15
Hypotheses.....	15
Method.....	18
Participants.....	18
Procedure.....	18
Materials.....	19
Statistical Analyses.....	25
Results.....	31
Discussion.....	50
References.....	63

List of Tables

Table	Description	Page
1	Demographic Characteristics of Treatment Seeking Women with Binge Eating Disorder (BED).....	33
2	Mean Costs of Family Physician Visits, Medication Use, Diagnostic Tests and Total Health Care Costs in the Past Six Months.....	35
3	Hierarchical Logistic Regression of Predictors in Order of Entry for Each Health Care Domain: Hypothesis I.....	36
4	Hierarchical Logistic Regression of Predictors in Order of Entry for Each Health Care Domain: Hypothesis: II.....	39

List of Appendices

Appendix	Description	Page
A	Health Care Utilization and Cost Survey.....	72
B	Sources and Methods of Costing for 10 Health Care Domains.....	76
C	HLM 3-Level Models.....	78
D	HLM 2-Level Models.....	79
E	HLM 2-Level Models for Hypotheses VII and IX.....	80

Depressive symptoms, attachment and health care utilization and cost among obese women with
binge eating disorder undergoing psychotherapy

The high rates and negative effects of depression make it one of the most costly and debilitating health conditions in the world. In 2003, the World Health Organization described depression as the single most burdensome illness, with personal and societal costs surpassing those of any other disease or condition (Wang, Simon, & Kessler, 2003). Compared to the non-depressed, depressed individuals have greater clinical morbidity, higher health care utilization and costs, and poorer health related quality of life (HRQOL) and overall functioning (Katon, 2003). Additionally, The Global Burden of Disease Study reported that depression is the biggest contributor to disease-related disability among women around the world (Kessler, 2003).

Another condition that is prevalent among women is binge eating disorder (BED) (Stice, 1999). As the most common eating disorder today (Hudson, Hiripi, Pope, & Kessler, 2007), diagnostic criteria of BED include: engaging in recurrent binge eating episodes, a loss of control and marked distress (Fairburn & Wilson, 1993). Additionally, BED has serious co-occurring issues including depression, obesity, and lowered HRQOL (Stice, 1999). The average age at which women with BED seek treatment is later than women with other eating disorders (Hudson et al., 2007). Seeking treatment for BED is often coincident with greater health problems associated with age and obesity, such as type II diabetes and cardiac disease (Fairburn & Harrison, 2003). Depression, obesity, low HRQOL, and increased age have all been associated with higher health care use and costs (Sansone, Sansone, & Wiedweman, 1998; Trakas, Lawrence, & Shear, 1999; Lengerke et al., 2007). Thus, BED with its co-morbid conditions, is a serious public health concern that negatively affects women's health and the health care system.

The health care utilization and costs of eating disorders have been examined by several studies worldwide, and in a review of these studies Simon, Schmidt, and Pilling (2005) indicated that the most comprehensive study reported the annual cost of eating disorders in Australia to be 22 million dollars. The authors also pointed out that the majority of research has focused on anorexia nervosa and bulimia nervosa and that more research is needed particularly in the area of BED. Thus, by examining specific characteristics of BED and how they relate to HRQOL and health care utilization and costs, effective treatment plans can be applied to target these issues and the personal, societal, and economic burdens of BED may be rationally addressed.

The current study examined both cross-sectional and longitudinal data from a sample of women with BED undergoing group psychotherapy. The relationships between attachment dimension and depression were examined and how they relate to HRQOL and health care utilization and cost. Additionally, the change in health care utilization and cost over the course of group psychotherapy and at a six month follow-up and the predictors of this change were investigated. Whether health care utilization and costs decreased concurrently with the improvement of depressive symptoms over the course of treatment was of particular interest. The following section will serve as a review of the research conducted to date on the relationship between depression and health care utilization and cost, obesity and health care utilization and cost, and the prevalence of depression and obesity among women with BED. These sections are followed by a review of the group psychotherapy used to treat BED and how one's attachment dimension is related to both health care utilization and cost and treatment outcome.

Depression and Health Care Utilization

Depression is described by the World Health Organization as the single most burdensome illness among middle-aged individuals living in both developing and developed countries (Wang,

Simon, & Kessler, 2003). In Canada, depression rates among citizens are high and have proven to be a significant contributor to the high annual health care expenditures. A recent survey found that among the general population the lifetime prevalence of major depressive disorder is 12.2% for those aged 26 to 45 years old (Patten et al., 2006), with women having higher rates by ratios of approximately 2:1 (Kessler, 2003).

Major depression is associated with heightened physical symptoms and reduced quality of life and overall functioning. The Global Burden of Disease Study reported that depression is the biggest contributor to disease-related disability among women today (Kessler, 2003).

Depressed individuals have increased rates of maladaptive health-related behaviours such as poor physical activity levels, smoking, and overeating. Patients suffering from a medical illness as well as depression have significantly greater amounts of medically unexplainable symptoms when compared to patients with the same medical illness but no depression (Katon, 2003).

Literature has shown that depression is associated with poor health related quality of life (HRQOL) and having a stronger focus on symptoms and physical pain caused from a medical issue (Katon). Hence, it is not surprising that depressed individuals are greater utilizers of both inpatient and outpatient health services (Hunsley, Lee, & Aubry, 1999).

Among a sample of mixed-aged and elderly patients, those with depressive symptoms and major depressive disorder had significantly higher medical costs than patients without depression. The higher costs were seen within all areas of the health care system including primary care visits, specialty visits, mental health visits, emergency room visits, pharmacy costs, lab and x-ray exams, and inpatient costs (Katon, 2003). Furthermore, a comparison of the medical costs of 9000 depressed and non-depressed elderly patients over a six month period

showed the depressed patients had 50% higher costs than the non-depressed patients after controlling for the severity of the medical illness (Katon).

Simon, Ormel, VonKorff, & Barlow (1995) found that within a health maintenance organization the combined costs of services for those patients with a depressive or anxiety disorder were 91.5% more than the combined costs of services for those with no psychiatric disorder. The large gap in costs for these two groups was due to greater utilization of both inpatient and outpatient services by the depressed or anxious patients. The high utilization of the health care system by depressed individuals has contributed greatly to Canada's overall annual health care costs. The health care expenditures associated with depression are estimated to be 14.4 billion dollars per year in Canada (Public Health Agency of Canada, 2001).

One can conclude that depressed individuals have lower HRQOL, higher rates of health care utilization and higher health care costs than non-depressed individuals. Thus, treatment targeted at improving depressive symptoms should, as a consequence, improve HRQOL and lower health care utilization and costs for these individuals. Obesity, like depression, is also prevalent among women and related to both depression and lowered HRQOL. Obese individuals also have co-occurring medical morbidities and high rates of health care utilization and costs compared to the non-obese.

Obesity and Health Care Utilization

Obesity is a growing concern in Canada as it is a common metabolic condition among the general population and is associated with many serious medical illnesses. Body mass index (BMI), a ratio of weight in kilograms by height in meters squared, is the most commonly used measure to determine one's health with regard to body weight (Gilmore, 1999). A healthy BMI is between 18.5 and 25. Obesity is defined as having a BMI of 30 or greater and national surveys

have found that up to 13.5% of Canadians meet this criterion (Birmingham, Muller, Palepu, Spinelli, & Anis, 1999). Among middle aged women, depression and obesity appear to go hand in hand, and as BMI increases the risk of depression also increases (Simon et al., 2005).

The high rate of obesity is alarming when taking into consideration that obesity is associated with lowered HRQOL, increased medical morbidity, and premature death. Obesity is also associated with higher rates of cardiovascular disease, hypertension, type II diabetes, gallbladder disease and cancer (Birmingham et al., 1999). In 1997 in Canada, 20% of endometrial cancer, gallbladder disease, hypertension, pulmonary embolism and type II diabetes cases were directly related to obesity. The cost of obesity related health care services in Canada in 1997 was estimated at \$1.8 billion or 2.4% of all health care costs for that year (Birmingham et al.). Additionally, being obese is related to poor health and greater health care utilization and costs when compared to the non-obese (Trakas, Lawrence, & Shear, 1999).

The relationship between obesity and medical utilization was examined by Sansone, Sansone, & Wiederman (1998) when they compared a sample of 83 obese (BMIs ranging from 27.4 to 53.2) and 111 non-obese (BMIs ranging from 17.1 to 27.1) women's medical records. The participants' records were examined with regard to number of medical diagnoses, number of contacts with the facility, number of prescriptions and number of physician appointments. Results indicated that the obese group had significantly more diagnoses, contacts with the facility, number of prescriptions, and number of physician visits (Sansone et al.).

One can conclude from the preceding review that both depression and obesity are related to multiple negative health outcomes and higher rates of health care utilization and cost. Although the prevalence of each of these medical issues is high among the general population

they have been found to co-occur at much higher rates among women with binge eating disorder (BED) (Telch & Stice, 1998; Spitzer et al., 1992; Striegel-Moore & Franko, 2003).

Binge Eating Disorder

Binge eating disorder (BED) was included in the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; APA, 1994) as an eating disorder not otherwise specified. The DSM-IV defines BED as the recurrent over-eating of a large amount of food within a short period of time. During this episode the patient feels a loss of control in which one cannot stop the excessive eating or moderate what or how much one eats. Overeating and loss of control define a binge. A binge eating episode will include three of the following criteria: eating faster than usual; eating not to satisfy hunger; eating in seclusion due to embarrassment; eating until painfully full; feeling depressed, guilty or disgusted following the binge. To meet diagnostic criteria for BED, the binge eating episodes must occur approximately two days a week for six months. Additionally, the binge eating should not co-occur with anorexia nervosa or bulimia nervosa (BN) (Fairburn & Wilson, 1993).

Among women, the lifetime prevalence of BED is high at 3.5 %, when compared to other eating disorders (Hudson et al., 2007). BED generally emerges during adolescence or early adulthood and risk factors associated with the disorder include being overweight, sociocultural pressures to be thin, thin-ideal internalization, body dissatisfaction, dieting, and negative affect (Stice, 1999). Women with BED tend to have co-occurring health issues including obesity, lowered HRQOL, and psychiatric conditions, most often being depression. Researchers report that 49% of women with BED have a lifetime history of a depressive disorder (Telch & Stice, 1998).

Fichter, Quadflieg, & Bradnl (1993) compared 22 participants with BED to a matched sample of 22 participants with bulimia nervosa (BN) and 16 obese participants. The BED ($M = 17.8$, $SD = 10$) and BN ($M = 22.1$, $SD = 12$) participants had higher scores on the Beck Depression Inventory (BDI; Beck, Steer & Garbin, 1988) compared to the obese patients who did not engage in binge eating ($M = 9.8$, $SD = 6$). These findings indicate that regardless of body weight, the individuals who engaged in binge eating had higher depressive symptoms compared to those who did not engage in binge eating. The second part of Fichter et al.'s study was longitudinal and showed that 68 BED patients had significant improvements in depression scores from admission ($M = 22.5$, $SD = 10$) to an inpatient program compared to discharge ($M = 12.2$, $SD = 11$) and at a three-year follow-up ($M = 17.5$, $SD = 14$). Depression scores at the three-year follow-up were significantly lower than the scores at admission, indicating that the improvements in depressive symptoms were long-term. The patients' body weight, however, did not improve significantly over the course of the study (Fichter et al.); meaning that depressive symptoms improved over the course of treatment even though body weight did not.

Along with depression, obesity is also highly prevalent among individuals with BED. Although obesity is not a specific criterion for the diagnosis of BED previous research has shown that the majority of patients with BED are overweight. A recent study investigated the BMIs of 723 patients attending a weight loss or eating disorder program. Of the 723 participants, 62.8% met the BED diagnostic criteria and had a BMI exceeding 35 and only 44.9% of individuals not meeting BED diagnostic criteria had a BMI of 35 or over (Spitzer et al., 1992). Additionally, among a sample of 1,837 men and 1,895 women, 1.5% met the diagnostic criteria for BED. The percentage of individuals (2.9%) with a BMI of 27.5 or greater and who met criteria for BED was almost double the percentage of non-BED individuals with a BMI of 27.5

or greater (Striegel-Moore & Franko, 2003). Furthermore, the average age at which women with BED seek treatment is later than women with other eating disorders (Hudson et al., 2007) and obesity and age have also been associated with lowered HRQOL (Hassan, Joshi, Madhavan, & Amonkar, 2003; Kind, Dolan, Gudex, & Williams, 1998). High rates of depression, obesity, increased age at the time of seeking treatment, and poor HRQOL co-occur with high health care utilization rates and high health care costs in those with BED when compared to the general population (Striegel-Moore et al., 2008; Stice, 1999).

Mond, Hay, Rogers, and Owen (2009), compared the health burdens of overweight individuals to those of eating disordered individuals. Self-report measures of BMI, eating disorder psychopathology, health care utilization and HRQOL were completed by 4643 participants. Overweight participants had significant physical impairment and little psychosocial impairment compared to eating disordered participants. Additionally, being both overweight and eating disordered was related to increased rates of family physician visits within the previous six months, and higher lifetime treatment from a health professional for eating and weight issues. These findings are important in that women with BED are typically overweight, and they have elevated physical impairments and psychosocial problems, all of which may lead to increased health care utilization and costs.

A similar study compared the health care utilization among adults diagnosed with an eating disorder to a matched non-eating disordered sample within a large health maintenance organization. Data were not collected through self-report measures, but through electronic health records for both inpatient and outpatient services. Data were collected for the year prior to the diagnosis of an eating disorder, the year of the diagnosis, and the year following diagnosis. Results indicated that patients diagnosed with an eating disorder had greater health care

utilization than the matched comparison group for all three data collection time points.

Additionally, the most frequent co-morbid issue among participants diagnosed with an eating disorder was major depression (Striegel-Moore et al., 2008). Depression, obesity, low HRQOL, and increased age have all been associated with higher health care use and costs (Sansone, Sansone, & Wiedweman, 1998; Trakas, Lawrence, & Shear, 1999; Lengerke et al., 2007). Thus, one can conclude that BED with its co-morbid conditions, is a serious public health concern that negatively affects women's health and incurs economic burden.

Psychological Treatment of BED

Group Psychodynamic Interpersonal Psychotherapy (GPIP) is a recently developed treatment for BED (Tasca, Mikai, & Hewitt, 2005). The overall goal of GPIP is to change patients' maladaptive interpersonal patterns of behavior, improve affect regulation, and modify one's self definition. In other words, the patterns that the client has developed in order to cope with anxiety need to be replaced by more appropriate anxiety-reducing methods (Tasca et al.). Another treatment approach for BED is group cognitive behavioural therapy (GCBT), where distorted beliefs about obtaining an idealized weight and shape are addressed through a series of educational, behavioural, and cognitive interventions. In a randomized control trial, Tasca and colleagues (2006) found that GPIP was more effective than a wait-list control condition and as effective as GCBT (Wilfley, 1996) in reducing depressive symptoms and days binged. Due to the nature of GPIP, Tasca and colleagues speculated that outcomes would be mediated by an individual's attachment dimension, specifically whether they had high or low levels of anxious attachment (Tasca et al., 2006). The next section will outline attachment theory and describe how one's attachment style (degree of anxious attachment) is related to GPIP treatment outcome by reviewing the Tasca et al. (2006) study.

Attachment Theory

Initially developed by John Bowlby, Attachment Theory sought to explain the effects of early parent-child relationships on later development and functioning (Bowlby, 1982).

Attachment behaviours (proximity seeking behaviors geared toward an attachment or parental figure) are thought to be a method of protection for individuals facing a threat in both childhood and adulthood (Mikail, Henderson, & Tasca, 1994). Bowlby proposed that during infancy we develop internal working models based on our experiences with caregivers who are more or less responsive to our needs. In infancy, if an attachment figure is unavailable when we feel threatened, we become anxious and attachment behaviours ensue. If the attachment figure is responsive we feel secure and the anxiety ceases; however, if attachment figures are unresponsive we become frustrated and developing secure attachment is unlikely (Mikail et al.). These experiences with caretakers are internalized over time into internal working models that define patterns of behaviour and affect regulation in adulthood (Bartholomew & Horowitz, 1991).

Responsive and reliable care giving in childhood is linked to a secure adult attachment style, whereas unresponsive or unreliable care giving is linked to anxious attachments defined as avoidant or anxious. Avoidant adult attachment style stems from care giving that was unresponsive. Anxious attachment stems from care giving that was inconsistent and unpredictable (Ciechanowski, Sullivan, Jensen, Romano, & Summers, 2003). Attachment styles tend to be consistent from childhood to adulthood (Shorey & Snyder, 2006) and have been used to help explain the differences between how individuals cope with distress and perceive others. Results of recent research indicate that one's attachment style may change by means of close interpersonal relationships or negative life events (Shorey et al.).

Securely attached adults are comfortable depending on others and trust that they will be comforted by another when needed. They have adequate self esteem and a general overall positive view of themselves and of others. Their affect regulation is adaptive (Ciechanowski et al., 2003). Anxiously attached adults are dependent upon others especially when faced with an emotional or physical problem. They tend to get overly close to others and fear rejection. They have a negative view of themselves and a positive view of others. Their affective system tends to be hyper activated, and so they over emphasize any distress or negative affect they experience (Tasca et al., 2009). Anxiously attached individuals experience high levels of relationship conflict and are generally unsatisfied with the relationships in their lives. Adults with avoidant attachment do not easily trust or confide in others as they view others as incapable to properly care for them. They tend to have a positive view of themselves and negative view of others, which leads to them being overly self reliant (Bartholomew et al., 1991). Individuals with avoidant attachment styles have low levels of intimacy in their lives and avoid situations involving commitment and care (Ciechanowski et al.). Their affective systems are deactivated and so they have difficulty experiencing and expressing affect (Tasca et al.). Based on the characteristics associated with each of the attachment dimensions, Shorey & Snyder (2006) have speculated that an individual's attachment style is important to consider when building a treatment plan.

Research has begun to explore the different attachment styles and their relationship to outcomes following psychotherapy. Shorey & Snyder (2006) have suggested that characteristics associated with each attachment style will affect how one responds to therapy. They believe that both researchers and therapists should take note of patients' attachment styles when considering interventions. Specifically, therapists should keep in mind that during treatment securely

attached individuals will face challenges and acknowledge problems; preoccupied or anxiously attached individuals are hypersensitive, experience high levels of negative affect and will act impulsively to alleviate the distress; dismissing or avoidantly attached individuals will be inhibited and have a tendency to resist the treatment. Furthermore, it was reported that individuals scoring high on avoidant attachment are less likely to seek help and disclose information about themselves (Ciechanowski et al., 2002; Vogel & Wei, 2005). As a result, they drop out of treatment at a higher rate compared to individuals scoring high on anxious attachment (Tasca et al., 2006).

McBride, Atkinson, Quilty, & Bagby (2006) compared the treatment outcomes of individuals with major depressive disorder (MDD) who scored high on either anxious or avoidant attachment. Fifty-six participants underwent 16 to 20 weeks of either interpersonal psychotherapy (IPT) or cognitive behavioural therapy (CBT). IPT focuses on developing healthy relationships where as CBT focuses on changing underlying cognitive distortions. Both therapies were shown to be equally effective in treating MDD. The authors predicted that participants scoring high on anxious attachment would have better outcomes following IPT and those scoring high on avoidant attachment would have better outcomes following CBT. Results showed that participants scoring high on attachment avoidance had significantly better treatment outcomes following CBT (McBride et al). In a similar study, Reis and Grenyer (2004) examined treatment response in 58 participants undergoing 16 weeks of expressive dynamic psychotherapy. They hypothesized that participants scoring high on avoidant attachment would have less favourable treatment outcomes due to their tendency to view others as rejecting and to avoid close relationships. Results showed a significant negative correlation between overall treatment response and participants with fearful, or avoidant attachment. The outcomes of these studies

indicate that individual attachment styles are an important characteristic to consider when choosing treatment. How an individual responds to various treatment options and their overall treatment outcome is dependent upon their attachment style.

Attachment Style and GPIP Outcome

Tasca et al. (2006) conducted a study investigating whether attachment style predicted treatment outcome (i.e., change in number of days binged, BMI and depression) in a randomized controlled trial of two group therapies for individuals with BED. Participants were 66 women treatment completers who met the DSM-IV diagnostic criteria for BED. The two treatment conditions were group psychodynamic interpersonal psychotherapy (GPIP) and group cognitive behavioural therapy (GCBT) (Wilfley, 1996). Participants were randomly assigned to GPIP, GCBT, or a no-treatment control condition. Participants were then assessed at pre-treatment, underwent 16 weeks of group therapy, and were re-assessed at post-treatment, six month and 12-month follow-ups. The focus of GCBT was to stop dietary restraint, expose clients to novel foods and rid them of problematic food and body-related beliefs as well as any cognitive distortions fueling their BED. In order to accomplish these goals healthy eating patterns were discussed, a food and thought diary was used and alternative strategies were presented with regards to healthy weight-loss and relapse prevention. Individuals in the control condition were assessed at pre-treatment, received no treatment for 16 weeks and were then reassessed.

Results showed a significant interaction between attachment style and treatment type, with higher need for approval (anxious attachment) significantly related to better treatment outcomes (decrease in the number of days binged) in GPIP. Conversely, lower need for approval (low anxious attachment) was related to better treatment outcomes (decrease in the number of

days binged) in GCBT. Additionally, GPIP resulted in significantly lower depression scores at post-treatment compared to the control group, whereas GCBT did not (Tasca et al., 2006).

These findings suggest that matching BED patients to treatment types based on whether they score high or low on anxious attachment may result in improved treatment outcomes in terms of a reduction in the number of days binged. Tasca and colleagues did conduct such a study in which patients with BED and high attachment anxiety were matched to GPIP, and data from that study was used in this thesis.

Attachment Dimensions and Health Care Utilization

Attachment dimensions and the characteristics associated with them have been used to help explain the differences in health care utilization among adults. Ciechanowski, Walker, Katon, & Russo (2002) compared the Relationship Styles Questionnaire (RSQ) (measure of attachment) and self-reported history of physical symptoms of 1119 female patients at a health maintenance organization in Washington State. Automated data were also collected regarding the patients' primary care utilization and costs. Results showed that anxiously attached patients reported significantly more somatic symptoms than those with secure attachment. Anxiously attached patients had a significantly higher number of health care visits than those with other attachment styles. Attachment style was also significantly related to health care costs among patients. Those with anxious attachment styles had significantly greater health care costs in the previous 12 months than those with other attachment styles.

A similar study investigated a sample of 111 chronic pain patients who completed the RSQ, the Centre for Epidemiological Studies-Depression Scale (Radloff, 1977), and a questionnaire about health care utilization in the previous three months. All questionnaires were completed at pre-treatment, and all except the RSQ were completed 12 months following the

four week pain program. Results showed an overall decrease in the number of pain-related health care visits. Patients with high depression scores had higher health care utilization than those with low depression scores. Patients with anxious attachment styles had significantly higher health care utilization than those with secure or fearful attachment styles (Ciechanowski, Sullivan, Jensen, Romano, & Summers, 2003).

The Present Study

The present study investigates the relationships among attachment style, depressive symptoms, health related quality of life (HRQOL) and health care utilization and costs among a sample of obese women with binge eating disorder (BED) undergoing group psychodynamic interpersonal psychotherapy (GPIP). The research questions of particular interest are: 1) whether attachment anxiety and depressive symptoms and experiences are associated with greater health care use and costs in women with BED; and 2) whether obese women with BED who score high on attachment anxiety and receive GPIP show greater improvements in depression and health related quality of life, and a greater decrease in health care utilization and cost compared to those scoring low on attachment anxiety who also receive GPIP.

Hypothesis I: Based on the studies by Ciechanowski et al. (2002, 2003), I hypothesized that women in the high anxious attachment condition will have greater health care utilization and cost at pre-treatment compared to women in the low anxious attachment condition.

Hypothesis II: Based on the substantive negative impact of depression on women's health and on past research showing depressed individuals having greater health care utilization and costs when compared to non-depressed individuals, I expected this same relationship among women with BED. Thus, depressive symptoms and experiences in treatment seeking women with BED

will be positively associated with higher health care utilization and costs at pre-treatment even after controlling for the effects of age and BMI.

Hypothesis III: Treatment seeking women with BED tend to be older and obese, and both age and obesity are shown to be related to lower health related quality of life (HRQOL) in other populations (Trakas et al., 1999; Lengerke et al., 2007). Hence, the impact of depression on HRQOL in women with BED may be confounded by age and weight. Given the substantive negative impact of depression on women's health, I hypothesized that the negative relationship between depressive symptoms and experiences and HRQOL among women with BED will remain significant even after controlling for the effects of age and BMI.

Hypothesis IV: Previous research showed that women with BED have high rates of depression, and that greater depressive symptoms are related to higher health care utilization and costs. Also depressive symptoms have been shown to improve following GPIP. Hence, I hypothesized that health care utilization and health care costs among women with BED will decrease from pre-treatment to six months post treatment.

Hypothesis V: Based on past research showing improvements in depressive symptoms for women with BED who underwent GPIP, I hypothesized that the depressive symptoms in women with BED will decrease from pre-treatment to six months post-treatment.

Hypothesis VI: The health related quality of life (HRQOL) of women with BED will increase from pre-treatment to six months post treatment.

Hypothesis VII: Past research showed that women with BED and who scored high on anxious attachment have better GPIP treatment outcomes (decreased number of days binged) than women with BED and who scored low on anxious attachment. Therefore, I hypothesized that women in the high anxious attachment condition would have a greater decrease in depressive

symptoms from pre-treatment to six months post-treatment than women in the low anxious attachment condition.

Hypothesis VIII: The decrease in depressive symptoms from pre-treatment to six months post-treatment among women in the high anxious attachment condition will be related to a decrease in health care utilization and costs.

Hypothesis IX: The decrease in depressive symptoms from pre-treatment to six months post-treatment among women in the high anxious attachment condition will be related to an increase in health related quality of life (HRQOL).

Method

Participants

One hundred and five obese women between the ages of 20 and 67 who met the DSM-IV diagnostic criteria for binge eating disorder (BED) participated in the current study. Only women were recruited for the current study because BED, depression and anxious attachment styles are more prevalent among women (Stice, 1999; Kessler, 2003). Participants either registered themselves in the study through advertisements or were recruited from the Regional Centre for the Treatment of Eating Disorders. Initially screened by phone, participants were assessed for frequency of binge eating in the past 28 days and the following exclusion criteria: not English speaking; history of an eating disorder other than BED; bipolar disorder diagnosis, psychosis or alcohol or drug dependence; pregnant or; participating in or plan to participate in a weight loss program within the next year.

Procedure

Participants qualifying for the study after the initial phone screening were interviewed and assessed for BED, binge eating, exclusion criteria, co-morbid disorders, medications, medical problems, personal and psychiatric history. The Structured Clinical Interview for DSM-IV (SCID; First, Spitzer, Gibbon, Williams et al., 1997) was used for Axis I diagnoses at this time. Based on the results of the need for approval scale of the Attachment Style Questionnaire (ASQ; Feeney, Noller, & Hanrahan, 1994) participants were assigned to treatment groups. Either an optimally matched GPIP condition (high anxious attachment condition: with the women who scored > 3.59 on need for approval) or a mismatched GPIP condition (low anxious attachment condition: with the women who scored ≤ 3.59 on need for approval). This study design allowed me to examine group level effects and differences between high and low anxious attachment

conditions. Prior to the 16-week GPIP treatment program, participants completed the measures and a demographics questionnaire. Following the 16-week GPIP treatment program and at a six month follow-up, participants completed all measures again.

Materials

Personality Assessment Inventory (PAI; Morey, 2007). The depression full scale of the Personality Assessment Inventory (PAI; Morey, 2007) was used to measure degree of depressive experiences and symptoms. The PAI is a 344-item self-report inventory designed to measure psychopathologies in respondents. The PAI scale scores are standardized against a census population so that a T-score of 50 represents the mean for the population with a standard deviation of 10. The criterion validity of the depression scale was demonstrated numerous times on both general and clinical populations (Morey, 2007) as well as within a female BED treatment seeking population (Antoniou, Tasca, Wood, & Bissada, 2003). Furthermore, the PAI has high internal consistency in general and clinical populations (Morey, 2007), as well as in eating disordered patients (Tasca, Wood, Demidenko, & Bissada, 2002).

The depression scale was developed in order to assess equally the three major components of depression to tap into depressive symptoms and experiences. The depression full scale is composed of three subscales; cognitive; affective; and physiological. The cognitive scale reflects an individual's expectancies or beliefs. A high score on this subscale represents feelings of hopelessness, low self esteem, and failure. The affective subscale reflects feelings of unhappiness, distress, and sadness. A high score on this subscale represents poor life satisfaction overall. Finally, the physiological subscale represents the maladaptive physical functioning signs of depression, such as lack of energy and sleep problems. The full scale was used to assess

depressive symptoms and experiences at pre-treatment for the cross-sectional analyses due to its ability to measure the full range of depressive symptomology (Morey, 2007).

Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988). The Beck Depression Inventory (BDI) is a 21-item self report assessment of the following depression-related symptoms and attitudes; mood; pessimism; sense of failure; lack of satisfaction; guilt feelings; sense of punishment; self dislike; self accusation; suicidal wishes; crying; irritability; social withdrawal; indecisiveness; distortion of body image; work inhibition; sleep disturbance; fatigue; loss of appetite; weight loss; somatic preoccupation, and loss of libido. The BDI was derived from clinical observations of the attitudes and symptoms displayed by depressed individuals. As such the content of the BDI more narrowly focuses on cognitions and symptoms of depression compared to the PAI which includes symptoms and broader depressive experiences (i.e., self esteem and life satisfaction). The BDI takes approximately five to ten minutes to complete and is self administered. The BDI has an alpha reliability for outpatients of 0.92 and retest correlations of 0.93 (Beck et al., 1996).

The BDI is scored by adding up the ratings (zero to three) of the 21-items, with higher scores representing greater depressive symptoms. Cut-off scores for the BDI typically depend upon why the assessment is being done and the population it is being used on, however, mean scores for various classifications are as follows; minimal depression ($M = 10.9$, $SD = 8.1$); mild depression ($M = 18.7$, $SD = 10.2$); moderate depression ($M = 25.4$, $SD = 9.6$) and severe depression ($M = 30.0$, $SD = 10.4$) (Beck et al., 1988). In the current study the BDI scores were used in the longitudinal analyses due to its heavy representation of the cognitive features of depression and thus its sensitivity to change over time (Brantley, Dutton, & Wood, 2004).

EQ-5D (EuroQol). Health related quality of life (HRQOL) was assessed using the EQ-5D. The EQ-5D is a five-question self-report measure of general health and quality of life. It assesses mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each domain is evaluated on three levels from no problems to substantial problems. Health utility values can be ascribed for each of the 243 combinations of the subjective responses from the five domains ($3^5 = 243$). By using an algorithm, each of these 243 health states are ascribed a societal health valuation ranging from zero (death) to one (perfect health). Valuation algorithms have only been validated in the United States (US) and the United Kingdom. In the present study, the D1 valuation model (Shaw, Johnson, Coons, & Joel, 2005) was used to compute an overall index score of HRQOL. The D1 model was derived from a representative US sample. It is a valid valuation model and is designed specifically to account for variance in interaction terms so the impact of one state on another is measured accurately (Shaw et al.). The mean EQ-5D score based on the D1 model for a US community sample of women ($n = 321$) within the mean age group of 35 to 44 years was $M = .89$, $SD = .18$ (Fryback, Dunham, Palter, Hanmer, Buechner et al., 2007).

Attachment Style Questionnaire (ASQ; Feeney, Noller, & Hanrahan, 1994). The Attachment Style Questionnaire (ASQ) is a 40-item self-report inventory used to assess dimensions of attachment. Questions are answered on a six-point likert scale with one representing “totally disagree” and six representing “totally agree”. The five constructs (scales) of attachment represented in the questionnaire are confidence in self and others (measure of attachment security), need for approval, preoccupation with relationships (measures of attachment anxiety), discomfort with closeness and relationships as secondary (measures of

attachment avoidance). Tasca and colleagues (2006) reported alphas for ASQ scales ranged from .70 to .83 for a sample of women with BED.

Participants in the current study were placed in treatment conditions based on their score on the need for approval scale of the ASQ. A mean score of 3.59 was used as the cut-off to determine if one was assigned to the high or low anxious attachment condition. Participants with a score greater than 3.59 were placed in the high anxious attachment condition and participants with a score of 3.59 or less were placed in the low anxious attachment condition. Only the need for approval scale (and not the preoccupation with relationships scale) was used as the measure of anxious attachment in the current study. This decision was based on the results of the Tasca et al. (2006) study where the need for approval scale significantly interacted with treatment type to predict binge eating outcome. The cut-off point of 3.59 was the point at which the two regression lines crossed in the need for approval by treatment interaction (Tasca et al., 2006). Specifically, higher need for approval scores were related to better treatment outcomes (decreases number of days binged) in GPIP and lower scores were related to poorer treatment outcomes.

Health Care Utilization and Cost Survey (Tasca, 2009). Participant's health care utilization and costs were assessed using a ten-item self-report inventory of health care use (Appendix A) that was developed specifically for this study (Tasca, 2009). Self-report measures of health care use are common and, if designed properly, have been found to be accurate when used for economic purposes (Bhandari & Wagner, 2006). The survey used in the current study meets the required criteria for accurate recall described by Bhandari and Wagner (2006). That is, participants had adequate cognitive skills, memory probes were provided (i.e., examples of health care services were provided), and a time frame of under 12 months was used (i.e., six months). Additionally, the written self report format is protective against faults in reporting due

to stigma which may occur over the telephone and in face-to-face interviews. The ten health care domains covered by the survey include family physician visits, medications, and diagnostic tests among others. Participants were asked to disclose if and how they have utilized each health care service within the previous six months. For example, the question would read “did you see a family physician within the past six months?” if yes, they were asked “how many times?” and “for what conditions/reasons?” Reliability and validity information for this survey is not available.

The total cost of all ten domains was used for analyses and further analyses were conducted separately on the top three domains. Family physician visits, diagnostic tests, and medication use were selected as the top three domains for the following reasons. (1) Four of the ten domains (i.e., other resources, outpatient visits, emergency department visits, inpatient visits) were each infrequently endorsed by fewer than 16.2% of participants at pre-treatment. Due to their low frequency, these domains were not included in analyses. (2) The specialist visits domain was excluded due to the high prevalence of idiosyncratic and costly medical issues that were unrelated to depression, obesity, or BED (e.g., car accident, epilepsy, cystic fibrosis). Additionally, specialist visits were excluded since in Canada a referral from a family physician is required, thus, the utilization of this health care domain was largely out of the control of the patient. (3) Lastly, health professional visits (e.g., chiropractors, massage therapists) and herbal remedies (homeopathic or store-bought remedies) were excluded as they typically are not paid through public and/or private health insurance in Canada. Thus, the use and cost of these domains are highly dependent upon an individual’s economic status rather than the variables of interest. Reduced list methods of calculating health care costs have been shown to cause little discrepancy with regards to the accuracy of cost estimation (Whynes & Walker, 1995).

Although medications were retained as a predictor for the analyses of depression and health care utilization and costs, antidepressant data were removed when calculating the cost of medications. This was done since the antidepressant use confounds the effects of depressive symptoms.

Costs for family physician visits and diagnostic tests were gathered from the most recent version of the Ontario Health Insurance Plan (OHIP) fee schedule. Medication costs were calculated using prices from the Government of Ontario's health information website, www.HealthyOntario.com, and through consultation with several local area pharmacists. A dispensing fee of \$7.00 and prescription mark-up of 8% was added to the cost of medication, depending on the number of refills required for the previous six months. All other costs were based on the OHIP fee schedule (e.g., outpatient, inpatient, emergency, medical specialist visits), recommended rates from professional organizations (e.g., health professional visits), and online resources (e.g., herbal remedy costs, other resources) (Appendix B).

Demographics Questionnaire. The demographics questionnaire consists of 227-items adopted from the Diagnostic Survey for Eating Disorders (revised by C. Johnson and M. Connors). Along with basic demographic questions the survey addresses eating related behaviours, weight history, treatment history, sexual history, social relationships, and family history. In the current study, only basic demographic questions were used in analyses (e.g., age, BMI etc.).

Group Psychodynamic Interpersonal Psychotherapy. Group psychodynamic interpersonal psychotherapy (GPIP) combines principles of psychodynamic, interpersonal and group therapy theories. Participants underwent 16 sessions (one per week) of 90-minute GPIP sessions with eight to ten clients per group. In the treatment manual, a revised version of Malan's

Triangle of Conflict and Triangle of Person (Tasca et al., 2005) is used to describe and define symptoms such as binge eating. Malan's Triangle was modified so that the sexual and aggressive impulses are replaced by attachment needs. In those with BED, the client's maladaptive attachments result in negative mood and/or anxiety which in turn result in binge eating symptoms. This revised model is called the Triangle of Adaptation by Tasca and colleagues (2005). This Triangle of Adaptation underlies maladaptive interpersonal patterns and self concepts, called Cyclical Relational Patterns (CRP), which underlie binge eating behaviors.

A CRP defines how an individual copes with an affective state, interpersonal behaviours, and self concept. CRPs include the interplay between acts of self (behaviours, thoughts and feelings), expectations of others, acts of others, and acts of self towards the self (i.e., self concept). Assessing a client's CRP informs the therapist of the clients' needs, affective states, behaviours, defenses, and self concept. Individuals engage in certain relationship patterns and communicate in specific ways that tend to confirm their self concept. The overall goal of GPIIP is to change the client's maladaptive interpersonal patterns of behaviour and ways of coping with negative affect, thus changing the self concept. In other words, the defense mechanisms that the client has developed in order to cope with anxiety need to be replaced by more appropriate anxiety-reducing methods, so that one's self definition becomes more positive. Better coping, reduced negative affect, and improved self concept results in a reduced need to binge.

Statistical Analyses

Cross-Sectional Analyses. The first three hypotheses are cross-sectional in nature and look at differences among participants and associations among variables prior to the beginning of treatment. To investigate hypothesis I that compares the health care utilization and costs of women in the high anxious attachment condition and women in the low anxious attachment

condition, an analysis of covariance (ANCOVA) was performed with age and BMI entered as covariates. For this analysis health care utilization and cost was the dependent variable and attachment condition (high and low attachment anxiety) served as the independent variable. For hypothesis II, to examine the relationship between depressive symptoms and experiences and health care utilization and cost while controlling for age and BMI, a hierarchical linear regression was conducted. The dependent variable in this analysis was health care utilization and cost. Age (entered at step one), BMI (entered at step two), and depressive symptoms (entered at step three) served as the independent variables. By doing this I investigated the relationship between depressive symptoms and health care utilization and cost over and above the effects of age and BMI. To indicate whether the negative relationship between depressive symptoms and experiences and HRQOL (dependent variable) remains significant even after controlling for age and BMI (hypothesis III) a similar hierarchical linear regression was conducted with HRQOL as the dependent variable.

Longitudinal Analyses

The longitudinal analyses in the current study examined changes in depressive symptoms, health care utilization and cost, and health related quality of life (HRQOL) in participants from pre-treatment to post-treatment and at the six month follow-up. Depressive symptoms, health care utilization and cost, and HRQOL were repeatedly measured at these three time points. Typically, repeated t-tests with a 5% alpha level would be used to compare pre- to post-treatment, and pre-treatment to the six month follow-up data. This would lead to accumulating Type I error rates, or the chance of a false-positive conclusion. Attempting to correct for the inflated Type I error rate by using Bonferroni's correction would result in reductions of power. Repeated ANOVA does allow for analyzing data across measurement times, but repeated

ANOVA has its challenges as well. First, repeated ANOVA requires complete data and the listwise deletion of data due to any missing data point (Gueorguieva & Krystal, 2004). HLM does not require complete data as long as the data are missing at random. Second, repeated ANOVA requires that the assumption of sphericity be met for analyses to be deemed accurate (Tasca et al., 2009). In order for sphericity to be assumed the error variances of the dependent variables must be similar and not correlated for all participants over the course of treatment (Tasca & Gallop, 2009). Due to the high level of variability in participants at pre-treatment and the tendency of treatment to drastically reduce scores from pre-treatment to post-treatment and then remain similar from the post-treatment to the six month follow-up, the sphericity assumption is often violated resulting in inflated Type I error rates. HLM, however, does not require that the assumption of sphericity be met.

Recall that in this study participants were assigned to conditions based on their degree of anxious attachment (high anxious attachment and low anxious attachment treatment conditions). Within each condition, participants received treatment within a psychotherapy group. So, the psychotherapy participants were “nested” within treatment groups, thus, the data had a hierarchical structure that could result in dependence (Tasca, Illing, Joyce, & Ogrodniczuk, 2009). This dependence may result in inflated Type I error rates and false “significant” results. Dependence in the data can be evaluated within HLM, and HLM models may be used to assess the impact of dependence on the outcome. If there is sufficient evidence for dependence in the grouped data (intraclass correlation coefficient (ICC) > .05), then analyses may be conducted at the group level (using a three-level growth model) or Type I error rates may be adjusted (in a two-level model) to account for the inflation. If there was little or no evidence for dependence in the data (ICC < .05) then data were analyzed at the individual level and a two-level growth

model was used with no Type I error rate adjustment. For analyses where there was evidence of dependence in the data ($ICC > .05$) the p-value (Type I error rate) was adjusted accordingly using the table provided by Kenny and colleagues (1998).

HLM includes random effects for both groups and individuals that vary across time, for example the pre-treatment measure of the outcome (intercept) and rate of change of the outcome (slope) (Tasca & Gallop, 2009). Outcomes in this study included participants' depressive symptom scores, HRQOL scores, and health care utilization and costs. Fixed effects are consistent and do not vary over the course of treatment, across individuals in two-level conditional models, or across groups in three-level conditional models (Tasca & Gallop). For example, the participant's treatment condition (high or low anxious attachment) is a fixed conditional comparison factor. Level-one of the models looks at rate of change in the outcome within the individuals over time. Level-two examines the differences between individuals in their rate of change over time. Differences between treatment groups' rates of change are modeled at level-three when necessary (Tasca et al., 2009).

Change in Health Care Utilization and Costs from Pre-Treatment to Six Months Post-Treatment (Hypothesis IV). The growth parameters or slopes of level-two of the HLM were examined to assess hypothesis IV. Health care utilization and costs of all participants over the course of psychotherapy served as the dependent variable.

Change in Depressive Symptoms from Pre-Treatment to Six Months Post-Treatment (Hypothesis V). The growth parameters or slopes of level-two of the HLM were examined for hypothesis V. Depressive symptoms of all participants over the course of psychotherapy served as the dependent variable.

Change in HRQOL from Pre-Treatment to Six Months Post-Treatment (Hypothesis VI). The growth parameters or slopes of level-two of the HLM were examined for hypothesis VI. HRQOL scores for all participants over the course of psychotherapy served as the dependent variable.

Comparing the Change in Depressive Symptoms between the High Anxious Attachment Condition and the Low Anxious Attachment Condition from Pre-Treatment to Six Months Post-Treatment (Hypothesis VII). The conditional parameter (high anxious attachment and low anxious attachment condition x slope) of the two-level HLM was examined in order to analyze hypothesis VI. Prior to data collection participants were placed into treatment conditions based on their degree of anxious attachment (as per their scores on the need for approval scale of the ASQ). This served as the independent variable at level-two, and the continuous dependent variable in this HLM was depressive symptoms represented by the participant's BDI score.

The Relationship between Change in Depressive Symptoms and Change in Health Care Utilization and Cost among Women in the High Anxious Attachment Condition (Hypothesis VIII). In order to examine hypothesis VII, two separate HLM analyses were conducted. First, the growth parameter, or slope of the two-level HLM was looked at for only the high anxious attachment condition, with depressive symptoms serving as the dependent variable. Second, the growth parameter, or slope of the two-level HLM was looked at for only the high anxious attachment condition again, but with health care utilization and cost serving as the dependent variable. HLM allows one to save the growth parameters for each individual or group into a data file. A conditional HLM was run with health care utilization and cost as the dependent variable and participant's depressive symptom slopes entered as a predictor.

The Relationship between Change in Depressive Symptoms and Change in Health Related Quality of Life among the High Anxious Attachment Condition (Hypothesis IX).

In order to examine hypothesis IX, two separate HLM analyses were conducted. First, the growth parameter, or slope of the two-level HLM was looked at for only the high anxious attachment condition with depressive symptoms serving as the dependent variable. Second, the growth parameter, or slope of the two-level HLM was looked at for only the high anxious attachment condition again, but with health related quality of life (HRQOL) as the dependent variable. Again, HLM allows one to save the growth parameters of individuals or groups into a data file. A conditional HLM was run with HRQOL as the dependent variable and participant's depressive symptoms slopes entered as a predictor.

Results

Data Screening

Data screening and common parametric statistical analyses were conducted using SPSS (Statistical Package for the Social Sciences) version 18.0. Multilevel modeling was conducted with the Hierarchical Linear Modeling program version 6.08 (Raudenbush et al., 2004).

Normality of Distributions. Normality of each variable at all time points were visually assessed by examining box-plots, stem and leaf plots, Q-Q Plots, histogram graphs, skewness and kurtosis. The data for total health care costs at the pre- and post-treatment were not normally distributed. A series of logarithmic transformations were performed on the skewed and platykurtic data. These transformations resulted in acceptable normality for the total health care costs data. The six month follow-up data for health care costs were also transformed in order to perform the longitudinal analyses. Data of health care costs for family physician visits, medications, and diagnostic tests were also not normally distributed at any time point and transformations were not successful in normalizing the data, and so each scale was dichotomized and dummy coded (0 = no utilization of the service, 1 = utilization of the service) and logistic regression analyses were applied.

Missing Data. Dependent measures in the current study were obtained at pre-, post-, and six months post-treatment. The first three hypotheses are cross-sectional in nature and examine only the pre-treatment data. A missing values analysis (MVA) was conducted on all pre-treatment variables (12) to determine the pattern of missing data. The two assumptions of data that are missing completely at random (MCAR) are that the probability of missingness of variable X is unrelated to the value of X itself and that the probability of missingness on variable X is unrelated to any other variables. The first assumption cannot be tested (only inferred

because we do not know the values) and the second assumption was tested through Little's MCAR Test. The test was not significant (*Little's MCAR* = 95.506, $p = .868$) and so I could assume the missing data were MCAR.

Hypotheses IV to VIII examine the longitudinal data using HLM. One advantage of using HLM to analyze longitudinal data is that it does not require complete data (measures obtained from every participant at every time point) as long as data are missing at random. An MVA was conducted on all pre-, post-, and six months post-treatment variables (36) to determine the pattern of missing data. The tests were not significant (*Little's MCAR* = 404.860, $p = .909$) and I assumed the missing data were MCAR.

Univariate Outliers. Univariate Outliers were examined for each dependent measure at each time point (age, BMI, HRQOL, depressive symptoms, and health care costs). Standardized scores for each of the aforementioned variables were computed and any values outside of 3.29 *SD* from the mean were considered outliers. The presence of one outlier in total costs of the three health care domains at pre, post and follow-up time points led to these cases being brought in to 3.29 *SD* (Tabachnik & Fidell, 2007). Age, BMI, depressive symptoms, and HRQOL contained no outliers.

Multivariate Outliers. Multivariate outliers were examined for all participants on all measures. *Mahalanobis distance* was computed for each participant and compared to the critical value of the χ^2 distribution. *Mahalanobis distance* is the distance of a case from the centroid of the remaining cases. The centroid is represented by the point where all the means of all the variables intersect. Multivariate outliers are said to be significant at the .001 level (Tabachnick & Fidell, 2001). Analyses revealed no multivariate outliers.

Cross Sectional Analyses

Table 1 provides data on demographic, medical, and diagnostic information of participants. Approximately one third of the women with BED had a current affective disorder and two thirds had a lifetime history of an affective disorder. All participants in the current study were overweight or obese (inclusion criteria), with the majority of participants being morbidly obese. Half of the participants had a health condition associated with or exacerbated by obesity (e.g., type II diabetes, hypertension, heart disease).

Table 1

Demographic Characteristics of Treatment Seeking Women with Binge Eating Disorder (BED)

Characteristic	<i>M</i>	<i>SD</i>	<i>n</i>	%
Age	44.30	11.75		
BMI	38.20	6.80		
Depression Scale PAI	64.73	13.31		
Depressive Symptom Score BDI	17.13	1.34		
EQ-5D Index Score	0.77	0.16		
Age of first binge	18.09	10.17		
Age of regular binge	24.67	12.00		
Current affective disorder			35	33.33
Lifetime history of affective disorder			71	67.62
Medical condition associated with obesity			53	50.48

Characteristic	<i>M</i>	<i>SD</i>	<i>n</i>	%
Race/Ethnicity				
White			90	85.71
Marital Status				
Married and common law			48	45.71
Single			27	25.71
Separated and divorced			22	20.95
Widowed			4	3.81
Education				
Less than high school			1	0.95
Completed high school			14	13.33
College/University			72	68.57
Graduate training			13	12.38
Employment Status				
Unemployed			14	13.33
Employed part time			16	15.24
Employed full time			69	65.71
Median Household Income Range			60,000 – 69,000	

Note: *N* = 105

A two sided independent samples t-test was used to compare mean PAI depression full scale T-scores and mean health related quality of life (HRQOL) scores (EQ-5D scores) from the sample of women in this study to US community-based samples, respectively. Hedges *g* was

used to determine effect size, with $g > .50$ indicating a medium effect and $g > .80$ indicating a large effect. The mean PAI depression full scale score for women with BED was 64.73 ($SD = 13.31$), indicating the BED sample had a significantly higher mean PAI depression full scale score compared to the normative sample, $M = 50$, $SD = 10$, $t(1103) = 13.86$, $p < .001$, *hedges g* = 1.42 (Morey, 2007). The EQ-5D mean score for this sample of women with BED, $M = .77$, $SD = .16$, was significantly lower than the mean for a US community sample of women within a similar mean age group, $M = .89$, $SD = .18$, $t(424) = 6.01$, $p < .001$, *hedges g* = .71 (Fryback et al., 2007).

Table 2 shows the estimated average cost in the previous six months for the three most commonly used health care services (family physician visits, medications and diagnostic tests) and the total health care costs of all ten health care domains.

Table 2

Mean Costs of Family Physician Visits, Medication Use, Diagnostic Tests, and Total Health Care Costs in the Past Six Months

Health Care Domains	<i>n</i>	<i>M (SD)</i>
Family Physician	102	125.26 (115.78)
Medications	102	296.33 (547.47)
Diagnostic Tests	98	73.12 (132.84)
Total Cost of Top Three Domains	104	482.39 (568.83)
Total Cost of Ten Domains	105	1, 379.50 (1251.86)

Note: Costs are in Canadian dollars. Medication costs exclude antidepressants. *M* = mean. *SD* = standard deviation. Sample sizes vary due to missing data for these domains.

Hypothesis I: Women in the high anxious attachment condition will have greater health care utilization and cost at pre-treatment compared to women in the low anxious attachment condition. Levene's Test of Equality of Error Variances revealed that the variance of total health care costs were equal across the high and low anxious attachment conditions ($Levene's = 1.027, p = .313$). Using an ANCOVA and controlling for the effects of age and BMI, total health care costs at pre-treatment were not significantly different between the high ($M = 1156.67, SD = 1037.07$) and low ($M = 1406.28, SD = 1162.76$) anxious attachment conditions ($F(1, 101) = .694, p = .407$) after controlling for the effect of age ($F(1, 101) = 1.636, p = .204$) and BMI ($F(1, 101) = 1.426, p = .235$).

Results of the logistic regressions of the top three separate categorical dependent variables (family physician visits, medication use excluding antidepressants, and use of diagnostic tests) of differences in health care use between the high and low anxious attachment conditions while controlling for age and BMI appear in Table 3.

Table 3

Hierarchical Logistic Regression of Predictors in Order of Entry for Each Health Care Domain

Variable	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>p</i>	<i>OR (95% CI)</i>
<i>Family Physician Visits</i>					
Age	0.031	0.025	1.554	0.213	1.031 (.983, 1.083)
BMI	-0.046	0.038	1.473	0.225	.955 (.886, 1.029)
Anxious Attachment	0.191	0.544	0.123	0.726	1.210 (.417, 3.517)

Variable	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>p</i>	<i>OR (95% CI)</i>
<i>Medication Use</i>					
Age	0.054	0.019	8.108	0.004	1.056 (1.017, 1.096)
BMI	-0.012	0.030	0.163	0.687	.988 (.931, 1.048)
Anxious Attachment	-0.040	0.426	0.009	0.925	.961 (.417, 2.216)
<i>Diagnostic Tests</i>					
Age	0.025	0.018	1.998	0.158	1.026 (.990, 1.062)
BMI	-0.019	0.030	0.390	0.533	.981 (.924, 1.041)
Anxious Attachment	0.139	0.416	0.111	0.739	1.149 (.508, 2.595)

Notes: *S.E.* = standard error; *OR* = odds ratio; *CI* = confidence interval.

For physician visits, one case with missing values was deleted, leaving data from 104 women: 87 women with and 17 women without family physician visits in the previous six months. Results indicated that age, BMI and anxious attachment were not associated with visiting a family physician in the preceding six months. A test of the full model was not significant, $\chi^2 (3, N = 104) = 3.09, p = .38, R^2 = .050$, indicating that the predictors, as a set accounted for only 5% of the variance in family physician visits.

For the hierarchical logistic regression analysis on medication use excluding antidepressants (Table 3), three cases with missing values were deleted, so data from 102 women were available: 59 women with and 43 women without medication use in the previous six months. Age was positively associated with medication use, $R^2 = .113$, Odds Ratio (*OR*) = 1.06, 95% Confidence Interval (*CI*) = 1.02, 1.09, $p = .004$. Age alone correctly classified 46.5% of women without medication use and 78% of women with

medication use, for an overall correct classification rate of 64.7%, $\chi^2 = 8.94$, $p = .003$.

BMI was not associated with medication use after controlling for age, $p = .689$. After controlling for age and BMI, anxious attachment condition was not associated with medication use, $p = .925$.

For the hierarchical logistic regression analysis on diagnostic test use (Table 3), 7 cases with missing values were deleted, so data from 98 women were available: 50 women with and 48 women without a diagnostic test in the previous six months. Results indicated that age, BMI and anxious attachment were not associated with undergoing a diagnostic test in the preceding six months. A test of the full model was not significant, $\chi^2(3, N = 98) = 2.64$, $p = .450$, $R^2 = .035$.

Hypothesis II: Treatment seeking women with BED with greater depressive symptoms and experiences will have higher health care utilization and costs at pre-treatment than women with lesser depressive symptoms and experiences, even after controlling for age and BMI. Using the Personality Assessment Inventory (PAI) depression full scale scores as the independent variable and total health care costs as the dependent variable, a hierarchical linear regression was run while controlling for the effects of age and BMI, respectively. Age was positively associated with total health care costs, $Adjusted R^2 = .06$, $\beta = .26$, $p = .009$. However, after controlling for age, BMI ($p = .34$) was not associated with total health care costs. After controlling for age and BMI, depressive symptoms and experiences ($p = .69$) were not significantly associated with total health care costs.

Results of the hierarchical logistic regressions of the top three separate categorical dependent variables (family physician visits, medication use excluding antidepressants,

and use of diagnostic tests) on age, BMI and depressive symptoms and experiences appear in Table 4.

Table 4

Hierarchical Logistic Regression of Predictors in Order of Entry for Each Health Care Domain

Variable	<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>p</i>	<i>OR (95% CI)</i>
<i>Family Physician Visits</i>					
Age	0.039	0.026	2.377	0.123	1.040 (.989, 1.094)
BMI	-0.037	0.041	0.848	0.357	.963 (.890, 1.043)
Depressive Symptoms and Experiences	0.006	0.021	0.082	0.775	1.006 (.965, 1.049)
<i>Medication Use</i>					
Age	0.055	0.019	8.208	0.004	1.062 (1.022, 1.104)
BMI	-0.010	0.031	0.100	0.752	.985 (.924, 1.048)
Depressive Symptoms and Experiences	0.039	0.018	4.623	0.032	1.040 (1.003, 1.077)
<i>Diagnostic Tests</i>					
Age	0.030	0.018	2.760	0.097	1.030 (.995, 1.067)
BMI	-0.013	0.031	0.188	0.665	.987 (.929, 1.048)
Depressive Symptoms and Experiences	0.003	0.016	0.034	0.854	1.003 (.973, 1.034)

Notes: *S.E.* = standard error; *OR* = odds ratio; *CI* = confidence interval.

For physician visits, six cases with missing values were deleted, leaving data from 99 women: 84 women with and 15 women without family physician visits in the previous six months. Results indicated that age, BMI and depressive symptoms and experiences scores were not associated with visiting a family physician in the preceding six months. A test of the full model was not significant, $\chi^2(3, N = 99) = 3.08, p = .38, R^2 = .053$, indicating that the predictors, as a set accounted for only 5.3% of the variance in family physician visits.

For the hierarchical logistic regression analysis on medication use excluding antidepressants (Table 4), eight cases with missing values were deleted, so data from 97 women were available: 57 women with and 40 women without medication use in the previous six months. Age was positively associated with medication use, $R^2 = .121$, Odds Ratio (OR) = 1.06, 95% Confidence Interval (CI) = 1.02, 1.10, $p = .004$. Age alone correctly classified 45% of women without medication use and 78.9% of women with medication use, for an overall correct classification rate of 64.9%, $\chi^2 = 9.09, p = .003$. BMI was not associated with medication use after controlling for age, $p = .752$. After controlling for age and BMI, depressive symptoms and experiences were associated with medication use, $R^2 = .184, OR = 1.04, 95\% CI = 1.003, 1.077, p = .032$. The full model with age, BMI and depressive symptoms and experiences accounted for 18.4% of the variance in medication use. Together the three variables correctly classified 47.5% of women without medication use and 82.5% for women with medication use, for an overall accurate classification rate of 68%, $\chi^2(3, N = 97) = 14.23, p = .003$.

For the hierarchical logistic regression analysis on diagnostic test use (Table 4), 11 cases with missing values were deleted, so data from 94 women were available: 47

women with and 47 women without a diagnostic test in the previous six months. Results indicated that age, BMI and depressive symptoms and experiences were not associated with undergoing a diagnostic test in the preceding six months. A test of the full model was not significant, $\chi^2(3, N = 94) = 2.94, p = .401, R^2 = .041$.

Hypothesis III: There will be a negative relationship between depressive symptoms and experiences and HRQOL among women with BED even after controlling for the effects of age and BMI. A linear regression model was conducted with health related quality of life (HRQOL) was the dependent variable. Age, BMI and the PAI full scale depression score were hierarchically entered in separate blocks as independent variables. Age was not associated with HRQOL ($\beta = .000, R^2 = .001, r = -.028, p = .791$). After controlling for age, higher BMI was significantly associated with lower HRQOL ($\beta = -.007, \Delta R^2 = .09, \text{partial } r = -.29, p = .004$). After controlling for age and BMI, greater depressive symptoms and experiences were significantly associated with lower HRQOL scores ($\beta = -.006, \Delta R^2 = .22, \text{partial } r = -.49, p < .001$). The full model including the three independent variables accounted for 30.8% of the variance in HRQOL, $R^2 = .308, p < .001$.

Longitudinal Analyses

Due to the nature of this research design and after an inspection of individual data plots (Singer & Willett, 2003) I determined that a logarithmic transformation of the time parameter was appropriate. This was done to model a sudden decrease in scores from pre- to post-treatment that was maintained at six months post-treatment. This is typical in clinical treatment participant data.

Before choosing an appropriate model for the data I answered three specific questions. First, are the data nested within groups? In the current study the participants are in treatment groups. Second, I examined whether there was dependence within the grouped data. Using the intraclass correlation coefficient (ICC) I calculated whether participants within groups were more similar to each other and less similar to participants in other groups. I assessed for dependence in the grouped data which might have resulted in an inflated Type I error using the method outlined by Tasca et al. (2009) in which three-level multi-level models (MLM) are used to calculate ICCs. ICCs indicate level of dependence in the grouped data, and any ICC greater than $\rho > .05$ indicates non-ignorable dependence (Kenny, Kashy, & Bolger, 1998). For each case where this occurred, I adjusted the alpha to account for the dependence using the table provided by Kenny et al. (1998). I then conducted the analyses at the level of the individual using a two level MLM (Appendix C). The equation used for calculating the ICC is derived from the three level MLM in which the between-group variance components (τ) of the conditional and unconditional models are evaluated:

$$ICC = \tau_{10j}(\text{conditional}) / (\tau_{10j}(\text{unconditional}) + \tau_{1ij})$$

The third question is whether or not the data were repeatedly measured. In the current study, participants completed measures at three different time points (pre-, post- and six months post-treatment) so a longitudinal MLM was used.

Also, I assessed the correlation of the individuals' baseline scores with their slopes. In all cases, the individual baseline scores and the slopes were correlated $> .20$ (all $ps < .05$), suggesting that baseline scores were associated with change. Hence baseline scores were controlled for in each MLM (Appendix B).

In order to determine how much variance was accounted for by the within person variance in health care costs (repeated measurement within persons) the following equation was used with the outputs from the base model.

$$\text{Variance} = \sigma^2 (\text{within person variance}) / (\tau_0 (\text{between person variance}) + \sigma^2)$$

The level-two unconditional model with the log-time parameter examines the individual's rate of change over time (slope), for example, the rate of decrease in depressive symptoms over the course of treatment. In order to calculate the amount of variance accounted for by adding the log-time parameter representing rate of change, the within person variances (σ^2) of the model without the time parameter (i.e., base model) and with the time parameters (i.e., unconditional model) were evaluated using the following equation:

$$\text{Pseudo } R^2 = (\sigma^2 (\text{base}) - \sigma^2 (\text{unconditional})) / \sigma^2 (\text{base})$$

Another method of evaluating the adequacy of an MLM is to assess model fit with the relative deviance statistics of nested models. The deviance statistic represents the log-likelihood statistic generated from the maximum likelihood estimation. To determine which model fits the data best one compares the deviance statistic of future models to the previous model against a chi square distribution. The degrees of freedom for the chi square test are the number of parameters in the new model minus the number of parameters in the base model. The equation used to determine which model is a better fit to the data is:

$$\Delta\chi^2 (df) = \text{deviance statistic from previous model} - \text{deviance statistic from new model}$$

Hypothesis IV: The health care costs of women with BED will decrease from pre-treatment to six months post-treatment. The ICC calculated from the three-level model of total logarithmically transformed health care costs was $p = .10$, indicating 10% dependence within groups. Since the ICC was higher than recommended ($> .05$ or 5%) the p-value was adjusted to .025 according to the table provided by Kenny and colleagues (1998). This allowed me to use a two-level model while maintaining the actual Type I error rate at .05.

The two-level base model indicated a significant amount of within and between person variance ($p < .001$). In this model the health care costs repeatedly measured within persons accounted for 39% of the total variance in the data. Subsequent models were compared to this base model to calculate how much additional variance was accounted for by adding log-time as a predictor to the model.

The two-level unconditional growth model (controlling for baseline) with log-time as a predictor showed that participants' slope parameters were not significantly different from zero, after adjusting the p-value to .025 ($\beta_{10} = -8.29$, $SE = 3.79$, $p = .031$). For this model the within-person variance accounted for by the log-time parameter was approximately 17.61% ($Pseudo R^2 = (108.43 - 89.34 / 108.43) = .1761$). Compared to the base model ($deviance = 1998.37$), the unconditional growth model, which models time ($deviance = 1987.96$) was a better fit to the data ($1998.37 - 1987.96 = 10.41$), $\Delta\chi^2(2) = 10.41$, $p < .005$. A significant amount of variance remains to be accounted for in the slopes (τ_1 variance component = 802.32, $p < .001$).

Hypothesis V: Depressive symptoms of women with BED will decrease from pre-treatment to six months post-treatment. The ICC calculated from the three-level

models was zero meaning there was no dependence in the grouped data of change in depressive symptoms. Hence, a two-level model to examine individual changes in depressive symptoms over time was used with no adjustment to the Type I error rate. Additionally, there was a significant amount of within and between person variance ($p < .001$). The within person variance of depressive symptoms scores (repeated measurement within persons) accounted for approximately 53% of the total variance.

The two-level unconditional growth model (controlling for baseline) with log-time as a predictor showed the average individual slope parameter was significantly different from zero ($\beta_{10} = -19.24$, $SE = 2.51$, $p < .001$). Thus, depressive symptom scores decreased from pre- to post-treatment and this decrease was maintained at the six month follow-up. The within person variance accounted for by adding the log-time parameter to the model is approximately 58% ($Pseudo R^2 = (73.12 - 30.54 / 73.12) = .5823$). Compared to the base model ($deviance = 1609.03$) which did not include any predictors, the unconditional growth model with log-time as a predictor ($deviance = 1547.29$) was a better fit to the data ($1609.03 - 1547.29 = 61.74$), $\Delta\chi(2) = 61.74$, $p < .001$. A significant amount of variability remains to be accounted for in the slopes (π_1 variance component = 375.26 , $p < .001$).

Hypothesis VI: HRQOL of women with BED will increase from pre-treatment to six months post-treatment. The ICC from the three-level model was .036, or 3.6%, indicating no appreciable effect of the group on individual change in HRQOL. Thus, the two-level model examining changes at the individual level over time was used without adjusting Type I error rate. The correlation between pre-treatment HRQOL scores and change in HRQOL was $-.73$, indicating a large sized relationship, therefore, I

controlled for participants pre HRQOL scores. The within person variance of HRQOL (repeated measurement within persons) accounted for approximately 41% of the total variance.

The two-level unconditional growth model (controlling for baseline) showed the average individual slope parameter was significantly different from zero ($\beta_{10} = .08$, $SE = .034$, $p = .019$). Thus, HRQOL scores increased from pre- to post-treatment and this increase was maintained at the six month follow-up. The within person variance accounted for by adding the log-time parameter to the model was approximately 5.5% ($Pseudo R^2 = .00906 - .00856 / .00906 = .05519$). Compared to the base model ($deviance = -228.77$) which did not include any predictors, the unconditional growth model with log-time as a predictor ($deviance = -233.69$) was not a better fit to the data ($-228.77 - (-233.69) = 5.08$), $\Delta\chi(2) = 5.08$, $p = .08$. A significant amount of variability remains to be accounted for in the slopes (τ_1 variance component = .052, $p < .001$).

Hypothesis VII: Women in the high anxious attachment condition will have a greater decrease in depressive symptoms than women in the low anxious attachment condition. To compare the high and low anxious attachment conditions on their change in depressive symptoms a two-level conditional growth model (controlling for pre scores) with study condition entered as a level-two predictor in the growth model was used (Appendix C). The effect of condition on the slope parameter was not significant ($\beta_{11} = 1.80$, $SE = 5.37$, $p = .738$). Thus, the women in the high anxious attachment condition did not have a greater decrease in depressive symptoms than the women in the low anxious attachment condition. Study condition (high anxious attachment and low anxious attachment) accounted for only .7% of variance in the data ($Pseudo R^2 = \text{unconditional } \sigma_1$

variance component- conditional σ_I variance component/unconditional σ_I variance component; $8.36 - 8.42/8.36 = -0.007$). Thus, the rate of change in depressive symptom scores between participants in the high and low anxious attachment conditions was not significantly different.

Hypothesis VIII: The decrease in depressive symptoms among women in the high anxious attachment condition will be related to a decrease in health care costs.

To analyze whether the decrease in depressive symptoms among women in the high anxious attachment condition is related to a decrease in health care costs, the slope estimates for change in depressive symptoms were computed and added as predictors in level-two of the MLM for change in health care costs. This resulted in $N = 74$ depression slope parameter values for this sample. A two-level unconditional log-time growth model was run with log transformed total health care costs as the dependent variable and participant's depressive symptom slopes entered as predictors in level-two (Appendix D). For all women (high and low anxious attachment conditions) results indicated no significant relationship between log transformed total health care costs and a decrease in depressive symptoms ($\beta_{11} = .198, SE = .161, p = .223$). Thus, the decrease in depressive symptoms for all participants was not related to a change in log transformed total health care costs.

To examine whether a decrease in depressive symptoms was related to log transformed total health care costs for participants only in the high anxious attachment condition a two-level conditional log-time growth model was run with interactions. Log transformed total health care costs was the dependent variable and the interaction between study condition (high and low anxious attachment) and depressive symptom

slopes was added as a predictor in level-two (Appendix D). Results indicated no significant difference among high and low anxious attachment conditions in their relationship between log transformed total health care costs and a decrease in depressive symptoms ($\beta_{13} = .202, SE = .357, p = .573$).

Hypothesis IX: The decrease in depressive symptoms among women in the high anxious attachment condition will be related to an increase in HRQOL. To analyze whether the decrease in depressive symptoms among women in the high anxious attachment condition was related to an increase in HRQOL, the slopes for change in depressive symptoms were computed as indicated above. With the available BDI slope parameters the total sample size for this hypothesis was $N = 68$. A two-level conditional log-time growth model was run with HRQOL as the dependent variable and participant's depressive symptom slopes entered as a predictor in level-two (Appendix D). For all women (high and low anxious attachment conditions) results indicated a significant relationship between change in HRQOL and a decrease in depressive symptoms ($\beta_{11} = .002, SE = .001, p = .05$). A decrease in depressive symptoms for all participants (high and low anxious attachment conditions) was related to an increase in HRQOL.

To examine whether a decrease in depressive symptoms was related to an increase in HRQOL for only participants in the high anxious attachment condition a two-level conditional log-time growth model with interactions was run. HRQOL was the dependent variable and the interaction between study condition (high and low anxious attachment) and depressive symptom slopes was added as a predictor in level-two (Appendix D). Results indicated no significant difference among the high and low anxious attachment

conditions in predicting the relationship between change in HRQOL and a decrease in depressive symptoms ($\beta_{13} = -.001$, $SE = .002$, $p = .63$).

Discussion

The current study examined the relationships between depressive symptoms, health related quality of life (HRQOL), and health care utilization and costs among 105 treatment seeking women with binge eating disorder (BED). The results of this study are preliminary; however, they contribute to an understanding of the personal and economic burdens of BED, as well as the positive implications of group psychotherapy.

Over two thirds of participants with BED had a lifetime history of an affective disorder, which is more than three times the rate for women in general (Patten, 2009). All women were overweight or obese (due to the inclusion criteria) with the majority being morbidly obese. Half had a current medical condition related to obesity. These rates of depression and medical problems related to obesity are consistent with previous research on treatment seeking women with BED (e.g., Tasca et al., 2006).

The average total self reported health care costs over the past six months for this sample of women with BED was \$1,379 ($SD = 1251.86$), or approximately \$2759.00 prorated over a one year period. This average is high compared to Canadian women aged 40 to 45 whose health care costs were estimated to be \$2022.00 in 2009 (Canadian Institute for Health Information, 2009). Thus, the self reported total health care costs of women with BED, which may underestimate actual costs to the health care system (Bhandari & Wagner, 2006), is at least 36.45% higher than Canadian age matched women. These results indicate the high economic burden of BED to the health care system. Additionally, our sample of women with BED had significantly lower HRQOL than a community sample of women with a similar mean age, indicating the personal burden of BED for these women (Stice, 1999).

The following section will outline the results of the cross sectional and longitudinal analyses related to the hypotheses outlined previously.

Cross Sectional Hypotheses

I hypothesized that higher depressive symptoms and experiences (scores on the PAI depression full scale) would be related to higher health care utilization and costs at the pre-treatment while controlling for age and BMI (hypothesis II). Women scoring higher in depressive symptoms and experiences at pre-treatment did not have significantly greater overall health care costs. However, further analyses did indicate that women scoring higher on depressive symptoms and experiences had significantly greater medication costs (excluding antidepressants). This finding has important clinical and economic implications. Future research is encouraged to determine whether treating depression will result in lowered medication costs. It may be that because depressed individuals have heightened physical symptoms and are greater utilizers of health care services (Hunsley, Lee, & Aubry, 1999; Kessler, 2003), they are prescribed more medications. Alternatively individuals who have more medical issues that require prescribed medications are more likely to become depressed or have heightened depressive symptoms. If treating depression does result in lowered medication costs, clinicians are encouraged to target depression among their patients who have BED. This would result in fewer physical complaints and less symptom reporting for the individual and relieve some of the economic burden of depression that is placed on the health care system.

Previous studies compared total health care costs between depressed individuals and non-depressed individuals. The current study included only obese women with BED

who have significantly greater depression scores than average. Thus, there may not have been a wide enough range of depression scores in the current study to see a significant relationship with total health care costs. Alternatively, it may be that medication costs among women with BED are the primary driver of their health care costs. Future research is encouraged to include a control condition of age matched obese women without BED to examine these possibilities.

I also hypothesized that the negative relationship between depressive symptoms and experiences and HRQOL would remain significant even after controlling for the effects of age and BMI (hypothesis III). Treatment seeking women with BED are older than those with other eating disorders. Increased age is associated with greater health problems and lower HRQOL (Fairburn & Harrison, 2003; Lengerke et al., 2007), thus I controlled for the effects of age. The effects of BMI were also controlled because BED is related to obesity and increased BMI has also been associated with lower HRQOL (Trakas, Lawrence, & Shear, 1999). As hypothesized, higher depressive symptoms and experiences scores were significantly related to lower HRQOL even after controlling for the effects of age and BMI. Similar results have been found among samples of individuals with other co-morbid mental disorders. For example, individuals with diabetes had significantly higher quality of life than individuals with both diabetes and a mental disorder (Nutter, Scheidt-Nave, & Baumeister, 2009). Additionally, in a study comparing the quality of life among obese women with BED and obese women without BED, results indicated the obese women with BED had significantly lower quality of life (Rieger et al., 2005).

The result in the current study showing that depressive symptoms and experiences are related to lower HRQOL indicates that the physical impairment related to obesity along with depressive symptoms and experiences may result in lowered HRQOL. So, the high prevalence of obesity among women with BED may be a significant burden on its own, independent of depression. Previous studies have found a significant relationship between being overweight or obese and having chronic pain. In a study of 3,471 twins, the twins who were overweight or obese reported significantly greater lower back pain, tension or migraine headaches, fibromyalgia, abdominal pain and chronic widespread pain than normal weight twins (Wright et al., 2010). Obesity has also been related to poor mobility. In a previous study obese individuals were found to have slower movements and balance constraints when completing an aiming task compared to individuals with a normal BMI (Berrigan et al., 2006). Obesity has also been significantly related to depression; that is, as BMI increased depressive symptoms also increased (Simon et al., 2005). All these findings are consistent with the notion that obesity results in lower HRQOL. Future research is encouraged to examine this relationship among depressed non-obese women in order to identify whether the lower HRQOL is a result of obesity and depressive symptoms or solely obesity and its effects on physical functioning. Does depression in a non-obese sample without BED still have negative effects on HRQOL? And, is a decrease in depression among a non-obese sample without BED related to an increase in HRQOL? If so, then obesity may be a substantial burden to women with BED and treatment should focus on both targeting depression and weight loss. These findings also stress the importance of measuring HRQOL and its physical components among obese women with BED over the course of treatment.

No study to date has examined the relationship between depressive symptoms and HRQOL in obese women with BED. The novelty of my study suggests the substantive and unique negative impact of depressive symptoms on HRQOL. The findings suggest some clinical directions for the treatment of BED. The strong association between depressive symptoms and lower HRQOL indicate that targeting depression in the treatment of BED would have wide ranging impacts on personal well-being. HRQOL should be assessed routinely as a treatment outcome in future research that examines BED.

Contrary to what was expected, women in the high attachment anxiety condition did not have greater health care utilization and costs at pre-treatment than women in the low attachment anxiety condition (hypothesis I). Several past studies have shown that individuals scoring high on anxious attachment had significantly more health care visits and costs than those scoring high on other attachment styles (Ciechanowski, Walker, Katon & Russo, 2002; Ciechanowski, Sullivan, Jensen, Romano, & Summers, 2003). One difference between the current study and previous studies is how attachment was used to examine this relationship. No past study has examined differences among a high anxious attachment condition and low anxious attachment condition. Previous studies compared individuals with high anxious attachment to individuals with high scores on other attachment styles such as avoidant or secure.

Due to how the anxious attachment conditions were created (using a cut-off score), participants in the current study may not have differed enough in degree of anxious attachment to see significant differences in measures. Additionally, scores on other attachment dimensions were not used in creating the high and low anxious

attachment conditions. It could be that some participants in the high anxious attachment condition also scored higher on avoidant attachment. This means that participants may have been assigned to the high anxious attachment condition when in fact their dominant attachment dimension was secure or avoidant. In the future, high and low anxious attachment conditions should differ significantly more than they did in the current study by only including participants who score extremely low or high on the need for approval scale. Scores on other attachment style scales (secure and avoidant) should also be taken into consideration when assigning participants to a high or low anxious attachment condition.

Past research has found individuals scoring high on avoidant attachment have significantly lower health care visits and costs than those scoring high on other attachment styles. Additionally, women with BED have high rates of depression (Telch & Stice, 1998) and depression has been shown to be related to increased health care utilization and costs (Hunsley, Lee, & Aubry, 1999). It may be that women in the current study all had higher than average health care costs due to their higher than average depressive symptoms and as a result, there may have been little variability to be detected.

Longitudinal Hypotheses

I hypothesized that depressive symptoms would significantly decrease over the course of group therapy (hypothesis V). As hypothesized, the depressive symptoms of treatment seeking women with BED decreased significantly from pre-treatment to post-treatment and this decrease was maintained at the six month follow-up. These results are consistent with past research. Several outcome studies indicated that depressive symptoms were significantly reduced by group psychological treatments (e.g., Tasca et

al., 2006; Wilfey et al., 2000; Wilson et al., 2010). Thus, group psychotherapy is recommended for obese women with BED as it has consistently been shown to improve depressive symptoms.

To date there are no studies examining the effects of group therapy on HRQOL in women with BED. In the current study, participants' HRQOL significantly increased from pre-treatment to post-treatment and this increase was maintained at the six month follow-up (hypothesis VI). Although statistically significant, the effect size was small (5.5%) and this outcome should be accepted with caution and should continue to be examined. This is a novel finding that implies group therapy for obese women with BED may significantly improve HRQOL which includes factors such as mobility, self-care, pain and discomfort, and anxiety and depression. Future research examining BED treatment should routinely measure HRQOL as an outcome measure in order to validate the effectiveness of the treatment.

I hypothesized that the health care costs of women with BED would decrease from pre-treatment to six months post-treatment (hypothesis IV). Due to dependence in the data the p-value was adjusted to .025. As a consequence, results were not statistically significant ($p = .031$), indicating that health care costs did not significantly decrease from pre-treatment to six months post-treatment. However, the within person variance accounted for by adding the log-time parameter suggested a medium effect (17.61%), and the model fit analysis suggested that the growth model was a better fit to the data. This implies the p-value may have been too conservative and the finding should be taken seriously despite that it was not statistically significant. The change in health care utilization and cost in women with BED from pre-treatment to six months post-treatment

could potentially be significant with increased power and more accurate measurements. No study to date has examined change in health care utilization and cost over the course of psychotherapy and future research is encouraged to continue observing this potential relationship. Including a follow-up measure after the six month follow-up (i.e., 12 month follow-up) may increase the chances of observing a significant decrease in health care use and costs by improving the precision of the slopes and reducing standard errors. In addition, many participants were on several medications and it would take time to make a doctor's appointment to discuss ending the prescription and then begin to wean off of it. Also, participants may have already had diagnostic test appointments that were previously booked. Hence, detecting a change in health care utilization and costs may take longer than six months following treatment completion.

Group Psychodynamic Interpersonal Psychotherapy was the treatment used in the current study. Past research has shown GPIP to be effective in decreasing depressive symptoms and days binged in participants (Tasca et al., 2006). Depression has been noted as one of the most costly health conditions in the world with depressed individuals having greater clinical morbidity, lower HRQOL, and higher health care costs than non-depressed (Wang, Simon, & Kessler, 2003). Additionally, women with BED have higher rates of depression and obesity than the general population (Stice, 1999). Thus, taken together, these findings suggest that GPIP for women with BED has positive personal impacts through decreased depressive symptoms, increased HRQOL and potentially positive economic impacts through decreased health care utilization and costs.

Attachment Condition x Treatment Hypotheses

I hypothesized that women in the high anxious attachment condition would have a greater decrease in depressive symptoms than women in the low anxious attachment condition (hypothesis VII). Results did not support this hypothesis as both conditions had similar rates of change in depressive symptoms over the course of treatment. This finding is not consistent with past research where women with BED that scored high on anxious attachment had better treatment outcomes following Group Psychodynamic Interpersonal Psychotherapy than women with BED that scored low on anxious attachment (Tasca et al., 2006). One difference in the Tasca et al. (2006) study is that the anxious attachment score was used as a continuous variable at pre-treatment and then correlated with change. In the current study anxious attachment was used as a categorical variable to assign participants to conditions. Participants being assigned to the high or low anxious attachment groups based on a cut-off score from a regression analysis of Tasca et al. (2006) study (where the regression lines crossed in the attachment by treatment interaction) may have resulted in two conditions that are too similar in degree of anxious attachment. Further, participants in the Tasca et al. (2006) study were also randomly assigned to therapy groups, meaning the groups were heterogeneous with regard to attachment dimensions. In the current study, participants were assigned to treatment groups based on their anxious attachment score; thus they were homogeneous with regard to the attachment anxiety dimension. Having treatment groups consisting of women who all scored either lower or higher in anxious attachment could affect the atmosphere of the group therapy and thus the effectiveness and outcomes.

I also hypothesized that the decrease in depressive symptoms among women in the high anxious attachment condition would be related to a decrease in health care costs (hypothesis VIII). Results did not support this hypothesis. Results also indicated no relationship between the decrease in depressive symptoms and the decrease in health care costs among all women (both the high and low anxious attachment conditions). No research previous has examined this relationship longitudinally. In the current study, participant's depressive symptoms did significantly decrease over the course of treatment; however, there may not have been enough time to see a change in health care utilization and cost in relation to the decrease in depressive symptoms. The latter outcome likely attenuated any relationship between change in depressive symptoms and change in health care costs. Future research is encouraged to continue examining this relationship over a longer period of time in order to allow a greater change in health care utilization and costs to be detected.

The current study also found that the decrease in depressive symptoms among women BED was related to an increase in HRQOL. However, the change in depressive symptoms and change in HRQOL relationship was not different between those with high vs. low attachment anxiety. One explanation for the relationship between the changes in these two constructs is that depression has been associated with increased physical pain and symptom reporting, which are elements of HRQOL. For example, patients with both a medical illness and depression had significantly greater amounts of medically unexplainable symptoms than patients with the same medical illness but no depression (Katon, 2003). Therefore, a decrease in depression may result in less physical pain and symptom reporting and thus an increase in HRQOL. Treatment associated with a

decrease in depressive symptoms is recommended for women with BED as it might result in an increase in HRQOL. It can be speculated that Group Psychodynamic Interpersonal Psychotherapy which targets depression will also result in improved HRQOL due to the decrease in physical pain and symptom reporting. Again, it should be noted that the EQ-5D does include a question on anxiety and depression; however, it is one question out of five. The remaining four questions examine characteristics related to physical well being. Women with BED have greater than average depressive symptoms. Thus treatment targeting depression is recommended to improve HRQOL for women with BED who also tend to have high depressive symptoms.

Limitations

Several limitations are acknowledged in the current study. First, our sample sizes for HLM were smaller than optimal which may have reduced the power of the analyses. For example, the p -value for hypothesis IV (change in health care costs over the course of treatment) was adjusted to .025 in order to accommodate for the dependence within the data and to keep the Type 1 error rate at .05. Results indicated a p -value of .031, a medium effect size and the model that included the log-time parameter was a better fit to the data. With a larger sample size this result may have been significant at the $p < .025$ level. The change in health care costs over the course of treatment for women with BED should continue to be examined.

Second, our sample was all female, 85% White, and the average household income indicated a moderately high socio-economic status on average. These characteristics are common among BED samples (e.g., Striegel-Moore, Wilson, Wilfey, Elder, & Brownell, 1998); however, results are not generalizable to samples with

different characteristics, for example males or participants of a different race. Future researchers are encouraged to use a more diverse sample or to control for these characteristics in analyses.

Third, the findings that there were no differences in health care costs at pre-treatment and that there were no differences in change in health care costs and depressive symptoms among the high and low anxious attachment conditions may be due to how the participants were assigned to conditions and by not taking into account other attachment style scores. A cut-off score of 3.59 was used to create the high and low anxious attachment conditions and participants may not have differed enough to result in differences between conditions. If a larger sample size were available three conditions of anxious attachment could be created (low, moderate, and high) and the low and high conditions could be compared in analyses.

Given the limitations of the current study, future research is encouraged to continue examining the effects of depressive symptoms and anxious attachment on health care utilization over the course of group psychotherapy with larger and more diverse samples. Measuring and comparing participants on both anxious and avoidant attachment scales is also encouraged. Health care utilization and cost should be examined after the six month time point as it may take more than six months to see an actual change in health care utilization behaviours.

Conclusion

To summarize, the cross sectional, pre-treatment results of this research show that treatment seeking women with binge eating disorder (BED) have higher health care costs than average. Depressive symptoms were related to higher medication use (not including

medications used to treat depression) and lower health related quality of life (HRQOL) even after controlling for age and BMI. Longitudinal results indicated treatment seeking women with BED who underwent Group Psychodynamic Interpersonal Psychotherapy (GPIP) experienced a significant decrease in depressive symptoms and a significant increase in HRQOL. Moreover, the results of this study suggest that treating depressive symptoms in women with BED may substantially improve the personal and economic burdens caused by this disorder.

This study provides further evidence of the positive impact of GPIP on depression and provides an initial assessment of GPIP's positive impact on HRQOL in overweight women with BED. This study also provides an initial assessment of the economic and personal burden of BED, and how depressive symptoms in particular are associated with an increase in both the personal and economic burden of BED for overweight and obese women. Based on the significant findings of this study primary care givers are encouraged to assess for binge eating symptoms and depression among their overweight and obese female patients. Timely intervention of depressive symptoms among women with BED may substantially reduce personal and economic burdens caused by this disorder.

References

- American Psychological Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington DC: Author.
- Bartholomew, K. & Horowitz, L. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, 51, 1173-1182.
- Bhandari, A. & Wagner T. (2006). Self-reported utilization of health care services: Improving measurement and accuracy. *Medical Care Research & Review*, 63, 217-35.
- Beck, T.A., Steer, A.R., & Brown, G.K. (1996). *The Beck Depression Inventory – II professional manual*. San Antonio: The Psychological Corporation.
- Beck, T.A., Steer, A.R., & Garbin, G.M. (1988). Psychometric Properties of the Beck Depression Inventory: Twenty-Five Years of Evaluation. *Clinical Psychology Review*, 8, 77-100.
- Berrigan, F., Simoneau, M., Tremblay, A., Hue, O. & Teasdale, N. (2006). Influence of obesity on accurate and rapid arm movement performed from a standing posture. *International Journal of Obesity*, 30, 1750-1757.
- Birmingham, C.L., Muller, J.L., Palepu, A., Spinelli, J.J., & Anis, A.H. (1999). The cost of obesity in Canada. *Canadian Medical Association Journal*, 160, 503-513.
- Brant, P.J., Dutton, G.R., & Wood, K.B. (2004). The Beck Depression Inventory-II and The Beck Depression Inventory-Primary Care (BDI-PC). In M.E. Maruish (Eds), *The Use of Psychological Testing for Treatment Planning and Outcomes Assessment*. (pp. 313-326). Lawrence Erlbaum Associates, Inc.: New Jersey.

- Brennan, K.A., Clark, C.L., & Shaver, P.R. (1998). Self-report measurement of adult attachment: An integrative overview. In J.A. Simpson & W.S. Rholes (Eds), *Attachment theory and close relationships* (pp. 46-76). New York: Guilford.
- Canadian Institute for Health Information (2008). *Health Care in Canada 2008* (Ottawa, Ont.: CIHI, 2008).
- Ciechanowski, P., Sullivan, M., Jensen, M., Romano, J., & Summers, H. (2003). The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain, 104*, 627-637.
- Ciechanowski, S.P., Walker, A.E., Katon, J.W., & Russo, E.J. (2002). Attachment theory: A model for health care utilization and somatization. *Psychosomatic Medicine, 64*, 660-667.
- Fairburn, C.G., & Wilson, G.T. (1993). Binge eating: Nature, assessment, and treatment. New York: Guilford Press.
- Feeney, A.J., Noller, P., & Hanrahan, M. (1994). Attachment in Adults. NY: Guilford Press.
- Feeney, A.J., & Ryan, M.S. (1994). Attachment style and affect regulation: Relationships with health behavior and family experiences of illness in a student sample.
- Fichter, M.M., Quadflieg, N., & Brandl, B. (1993). Recurrent overeating: An empirical comparison of binge eating disorder, bulimia nervosa, and obesity. *International Journal of Eating Disorders, 14*, 1-16.
- First, M.B., Spitzer, R.L., Gibbon, M., & Williams, J.B., & MHS Staff (1997). *Computer-assisted SCID – Clinician version*. Toronto, Ontario: Multi-Health Systems.

- Fryback, D.G. Dunham, N.C., Palta, M., Hanmer, J., Buechner, J., Cherepanov, D., et al. (2007). US Norms for Six Generic Health-Related Quality-of-Life Indexes From the National Health Measurement Study. *Medical Care*, 45, 1162-1170.
- Gueorguieva, R. & Krystal, H.J. (2004). More Over ANOVA: Progress in Analyzing Repeated-Measured Data and Its Reflection in Papers Published in the Archives of General Psychiatry. *Archives of General Psychiatry*, 61, 310-317.
- Gilmore, J. (1999). Body mass index and health. *Health Reports*, 11, 31-43.
- Hassan, M.K., Joshi, A.V., Madhavan, S.S., & Amonkar, M.M. (2003). Obesity and health-related quality of life: A cross-sectional analysis of the US population. *International Journal of Obesity*, 27, 1227-1232.
- Hudson, J.I., Hiripi, E., Pope, H.G., & Kessler, R.C. (2007). The Prevalence and Correlates of Eating Disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*, 61, 348-358.
- Hunsley, J., Lee, C.M., & Aubry, T. Who uses psychological services in Canada? *Canadian Psychology*.
- Johnson, C. & Connors, M.E. *The etiology and treatment of bulimia nervosa: A biopsychosocial perspective*. New York: Basic.
- Katon, J. W. (2003). Clinical and health services relationships between major depression, depressive symptoms, and general medical illness. *Society of Biological Psychiatry*, 54, 216-226.
- Kenny, D.A., Kashy, D.A., & Bolger, N. (1998). Data Analysis in Social Psychology. In D. Gilbert, S.T. Fiske, & G Lindzey (Eds), *Handbook of Social Psychology*, (4th ed, Vol. 1, pp. 233-265). McGraw Hill: New York.

- Kessler, R.C. (2003). Epidemiology of women and depression. *Journal of Affective Disorders*, 74, 5-13.
- Kind, P., Dolan, P., Gudex, C., & Williams, A. (1998). Variations in Population Health Status: Results from a United Kingdom National Questionnaire Survey. *BMJ*, 316, 736-741.
- Lengerke, T.V. & John, J. (2007). Excess use of general practitioners by obese adults: Does health-related quality of life account for the association? *Psychology, Health & Medicine*, 12, 536-544.
- McBride, C., Atkinson, L., Quilty, C.L., & Bagby, M.R. (2006). Attachment as Moderator of Treatment Outcome in Major Depression: A Randomized Control Trial of Interpersonal Psychotherapy Versus Cognitive Behavioral Therapy. *Journal of Consulting and Clinical Psychology*, 74, 1041-1054.
- Mikai, F.S., Henderson, R.P., & Tasca, A.G. (1994). An Interpersonally Based Model of Chronic Pain: An Application of Attachment Theory. *Clinical Psychology Review*, 14, 1-16.
- Mond, M.J., Hay, J.P., Rodgers, B., & Owen, C. (2009). Comparing the Health Burden of Eating-Disordered Behavior and Overweight in Women. *Journal of Women's Health*, 18, 1-9.
- Morey, L.C. (2007). Personality Assessment Inventory Professional Manual, second edition. Odessa, FL: Psychological Assessment Resources.

- Noftle, E.E., & Shaver, P.R. (2006). Attachment dimensions and the big five personality traits: Associations and comparative ability to predict relationship quality. *Journal of Research in Personality, 40*, 179-208.
- Patten, B.S., Wang, J.L., Williams, V.A.J., Currie, S., Beck, A.C., Maxwell, J.C., & el-Guebaly, N. (2006). Descriptive epidemiology of major depression in Canada. *Can J Psychiatry, 51*, 84-90.
- Piper, W.E., Ogrodniczuk, J.S., McCallum, M., Joyce, A.S. & Rosie, J.S. (2003). Expression of Affect as a Mediator of the Relationship Between Quality of Object Relations and Group Therapy Outcome for Patients With Complicated Grief. *Journal of Consulting and Clinical Psychology, 71*, 664-671.
- Public Health Agency of Canada (2001). *The Economic Burden of Mental Health Problems in Canada*. Retrieved from http://www.phac-aspc.gc.ca/publicat/cdic-mcc/22-1/d_e.html
- Radloff, L.S. (1991). The Use of the Center for Epidemiologic Studies Depression Scale in Adolescents and Young Adults. *Journal of Youth and Adolescence, 20*, 149-166.
- Reis, S. & Grenyer S.F.B. (2004). Fearful Attachment, Working Alliance and Treatment Response for Individuals with Major Depression. *Clinical Psychology and Psychotherapy, 11*, 414-424.
- Sansone, R.A., Sansone, L.A., & Wiederman, M.W. (1998). The relationship between obesity and medical utilization among women in a primary care setting. *International Journal of Eating Disorders, 23*, 161-167.

- Shaw, J.W., Johnson, J.A., & Coons, S.J. (2005). US Valuation of the EQ-5D Health States: Development and Testing of the D1 Valuation Model. *Medical Care*, 43, 203-220.
- Shorey, S.H., & Snyder, R.C. (2006). The Role of Adult Attachment Styles in Psychopathology and Psychotherapy Outcomes. *Review of General Psychology*, 10, 1-20.
- Simon, G., Ormel, J., VonKorff, M., & Barlow, W. (1995). Health care costs associated with depressive and anxiety disorders in primary care. *The American Journal of Psychiatry*, 152, 352 -357.
- Simon, J., Schmidt, U., & Pilling, S. (2005). The health service use and cost of eating disorders. *Psychological Medicine*, 35, 1543-1551.
- Spitzer, R.L., Devlin, M., Walsh, B.T., Hasin, D., Wing, R., Marcus, M., Stunkard, A., Wadden, T., Yanovski, S., Agras, S., Mitchell, J., & Nonas, C. (1992). Binge eating disorder: A multisite field trial of the diagnostic criteria. *International Journal of Eating Disorders*, 11, 191-203.
- Stice, E. (1999). Clinical implications of psychological research on bulimia nervosa and binge eating disorder. *Psychotherapy in Practice*, 55, 675-683.
- Striegel-Moore, R.H., & Franko, D.L. (2003). Epidemiology of binge eating disorder. *International Journal of Eating Disorders*, 34, S19-S29.
- Striegel-Moore, R.H., DeBar, L., Wilson, T.G., Dickerson, J., Rosselli, F., Perrin, N., Lynch, F., & Kraemer, C.H. (2008). Health service use in eating disorders. *Psychological Medicine*, 38, 1465-1474.
- Tasca, A.G. (2009). *The health care utilization and cost survey*. Unpublished scale.

- Tasca, A.G., Balfour, L., Ritchie, K., & Bissada, H. (2007). Change in Attachment anxiety is associated with improved depression among women with binge eating disorder. *Psychotherapy; Theory, Research, Practice, Training*, 44, 423-433.
- Tasca, A.G., Gallop, R. (2009). Multilevel Modeling of Longitudinal Data for Psychotherapy Researchers: I. The Basics. *Psychotherapy Research, iFirst article*, 1-9.
- Tasca, A.G., Illing, V., Joyce, S.A., & Ogrodniczuk, S.J. (2009). Three-level Multilevel Growth Models for Nested Change Data: A Guide for Group Treatment Researchers. *Psychotherapy Research*, 19, 1-10.
- Tasca, A.G., Mikail, F.S., & Hewitt, L.P. (2005). Group Psychodynamic Interpersonal Psychotherapy: Summary of a treatment model and outcomes for depressive symptoms. In M.E. Abelian (Ed.) *Focus on Psychotherapy Research* (pp. 159-188). Nova Science Publishers.
- Tasca, A.G., Ritchie, K., Conrad, G., Balfour, L., Gayton, J., Lybanon, V., & Bissada, H. (2006). Attachment scales predict outcome in a randomized controlled trial of two group therapies for binge eating disorder: An aptitude by treatment interaction. *Psychotherapy Research*, 16, 106-121.
- Tasca, A.G., Szadkowski, L., Illing, V., Trinneer, A., Grenon, R., Demidenko, N., Krynski, Balfour, L., & Bissada, H. (2009). Adult attachment, depression, and eating disorder symptoms: The mediating role of affect regulation strategies. *Personality and Individual Differences*, 47, 662-667.

- Telch, F.C., & Stice, E. (1998). Psychiatric comorbidity in women with binge eating disorder: Prevalence rates from a non-treatment seeking sample. *Journal of Consulting and Clinical Psychology, 66*, 768-776.
- Trakas, K., Lawrence, K., & Shear, H.N. (1999). Utilization of health care resources by obese Canadians. *Canadian Medical Association Journal, 160*, 1457-1462.
- Wang, S.P., Simon, G., & Kessler, C.R. (N/A). The economic burden of depression and the cost-effectiveness of treatment. *International Journal of Methods in Psychiatric Research, 12*, 22-33.
- Wheeler, K., Grenier, P., & Boulton, M. (2005). Exploring alexithymia, depression, and binge eating in self-reported eating disorders in women. *Perspectives in Psychiatric Care, 41*, 114-123.
- Whynes, K.D., & Walker, R.A. (1995). On approximations in treatment costing. *Health Economics, 4*, 31-39.
- Wilfey, D.E., Friedman, M.A., Dounchis, J.Z., Stein, R.I., Welch, R.R., & Ball, S.A. (2000). Comorbid Psychopathology in Binge Eating Disorder: Relation to Eating Disorder Severity at Baseline and Following Treatment. *Journal of Consulting and Clinical Psychology, 68*, 641-649.
- Wilfey, D.E., Stein, R.I., Friedman, M.A., Beren, S.A., & Wiseman, C.V. (1996). Group cognitive behavioral therapy for Binge Eating Disorder. Unpublished manuscript.
- Wilson, G.T., Wilfley, D.E., Agras, W.S., & Bryson, S.W. (2010). Psychological Treatments of Binge Eating Disorder. *Archives of General Psychiatry, 67*, 94-101.

Wright, L.J., Schur, E., Noonan, C., Ahumada, S., Buchwald, D. & Afari, N. (2010).

Chronic Pain, Overweight, and Obesity: Findings from a Community-Based Twin Registry. *The Journal of Pain*, 11, 628-635.

Appendix A

ID#: _____

Date: _____

Health Care Utilization and Cost Survey

Please respond to all of the following questions regarding your health care use and costs **for the past 6 months only**. When answering the questions, *do not* include activities associated with participation in this research study.

1. Have you had a health or mental health condition that required a visit with a health professional or required taking prescribed medication in the past 6 months?

Yes ____ No ____

If Yes: What condition(s) _____

2. Did you see a family physician in the past 6 months?

Yes ____ No ____

If Yes: How many times? _____

For what condition(s)/reason(s)? _____

3. Did you see a medical *specialist* (e.g. Psychiatrist, Internist, Gastroenterologist, Physiatrist, Cardiologist, Cancer Specialist, Dermatologist, etc.) in the past 6 months?

Yes ____ No ____

If Yes: What type of specialist _____

How many times? _____

How many different specialists? _____

For what condition(s)? _____

4. Were you hospitalized for a health or mental health condition in the past 6 months?

Yes ____ No ____

If Yes: How often? _____

How many days in total? _____

For what condition(s)? _____

5. Did you visit an Emergency Department at a hospital in the past 6 months for a health or mental health condition that you had?

Yes ____ No ____

If Yes: How many times? ____

For what condition(s)? _____

6. Have you had a hospital visit as an outpatient (i.e., not overnight) with a health or mental health professional (Physician, Psychologist, Dietician, Social Worker, Nurse, etc.)?

Yes ____ No ____

If Yes: How many visits? ____

With which health profession(s)? _____

For what condition(s) /reason(s)? _____

7. Have you had any diagnostic tests (e.g., blood test, MRI, CAT, EEG, ECG, urine test, sleep study, etc.) related to a health or mental health condition in the past 6 months?

Yes ____ No ____

If Yes: How many types of tests? ____

What type of tests? _____

For what condition(s)? _____

8. Have you taken any prescribed medications for a health or mental health condition in the past 6 months?

Yes ____ No ____

If Yes: How many types of medications? ____

For what condition(s)? _____

How were the medications paid for? (check all that apply)

Public insurance (e.g., ODSP, Trillium, etc.) ____

Private health insurance plan through work or school ____

Paid for the medications yourself ____
 Received free samples ____

4. Have you taken any homeopathic or herbal remedies (e.g., St. John's Wort, Echinacea, Ginseng, etc.) specifically for a health or mental health condition in the past 6 months?

Yes ____ No ____

If Yes: How many types of remedies? ____

What types of remedies? _____

For what condition(s)? _____

5. Have you seen another health or mental health professional (Physician, Psychologist, Chiropractor, Massage Therapist, Dietician, Nurse, etc.) *not* as part of a hospital visit (i.e., in the community) in the past 6 months?

Yes ____ No ____

If Yes: What type of professional? _____

How many times? ____

For what condition(s)? _____

How did you pay for the service? (check all that apply)

Public insurance (e.g., ODSP, Trillium, etc.) ____

Private health insurance plan through work or school ____

Paid for the medication yourself ____

Service was free ____

6. Did you use any other health or mental health resources (e.g., drop in centre, support group, AA, home care, public health, community resource centre, religious or spiritual care, etc.) during the past 6 months?

Yes ____ No ____

If Yes: What type of resource(s)? _____

How many times? ____

For what condition(s)? _____

7. Did you “work” (i.e., paid employment, go to school, take care of young children, take care of a disabled person, or volunteered) during the past 6 months?

Yes: _____ No: _____

If Yes: Did you miss any days of any of these activities due to a medical or mental health condition(s) in the past 6 months?

How many days? _____

For what condition(s)? _____

8. Did a spouse, partner, family member, child, or friend miss any days of work or other activities because of *your* medical or mental health condition in the past 6 months?

Yes: _____ No: _____

If Yes: How many days? _____

For what condition(s)? _____

9. Did you receive any form of disability funds as a result of a health or mental health condition during the past 6 months?

Yes: _____ No: _____

If Yes: Are you currently on disability? Yes _____ No _____

For how many months have you been or were on disability? _____

For what condition(s)? _____

THANK YOU

Appendix B

Sources and Methods of Costing for 10 Health Care Domains

Health Care Domain	Costing Source and Method
Family Physician Visits	Source: Online Fee Schedule, Ontario Ministry of Health and Long Term Care www.health.gov.on.ca/english/providers/program/ohip/sob/sob_mn.html
Medications	Source: Ontario Drug Benefit Formulary/Comparative Drug Index www.healthinfo.moh.gov.on.ca/formulary/ Methods: \$7 dispensing fee and 8% markup were added to each prescription. Average Dose When Not Indicated: www.HealthyOntario.com . *Consultation with The Ottawa Hospital Pharmacist for those not found
Diagnostic Tests	Source: Online Fee Schedule, Ontario Ministry of Health and Long Term Care www.health.gov.on.ca/english/providers/program/ohip/sob/lab/lab_mn.html
Health Professional Visits	Methods and Sources: Average of estimates provided by three local professionals per profession. For Psychologists: fee recommendation provided by the Ontario Psychological Association.
Specialist Visits	Source: Online Fee Schedule, Ontario Ministry of Health and Long Term Care www.health.gov.on.ca/english/providers/program/ohip/sob/physerv/physerv_mn.html
Inpatient Visits	Source: Ontario Case Costing Initiative www.occp.com
Outpatient Visits	Source: Online Fee Schedule, Ontario Ministry of Health and Long Term Care www.health.gov.on.ca/english/providers/program/ohip/sob/physerv/physerv_mn.html

Herbal Remedies	<p>Source: Average of Five Cost Consults</p> <p>Two In-Store Consults: Market Organics, Ottawa ON Nutrition House, Ottawa ON</p> <p>Three Online Consults: www.VitaminShop.ca www.AbacoHealth.ca www.MyVitaminSuperstore.ca</p>
Emergency Visits	<p>Source: Average Ontario ER Visit Cost Canadian Institute for Health Information</p> <p>Dawson, H. & Zinck, G. (2009). ED spending in Canada: A focus on the cost of patients waiting for access to an in-patient bed in Ontario. <i>Health Care Quarterly</i>, 12, 25-28.</p>
Other Resources	N/A – services free of cost

Appendix C

HLM 3-Level Models

Base Model

$$\text{Level 1: } Y = \pi_0 + e$$

$$\text{Level 2: } \pi_0 = \beta_{00} + r_0$$

$$\text{Level 3: } \beta_{00} = \gamma_{000} + u_{00}$$

Unconditional Log-Time Model

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + r_0 \\ \pi_1 &= \beta_{10} + r_1 \end{aligned}$$

$$\begin{aligned} \text{Level 3: } \beta_{00} &= \gamma_{000} + u_{00} \\ \beta_{10} &= \gamma_{100} + u_{10} \end{aligned}$$

Unconditional Log-Time Model (Controlling for Pre-Scores)

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + \beta_{01} * (\text{Pre scores of the dependent variable}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} * (\text{Pre scores of the dependent variable}) + r_1 \end{aligned}$$

$$\begin{aligned} \text{Level 3: } \beta_{00} &= \gamma_{000} + \gamma_{001} * (\text{Pre scores of the dependent variable}) + u_{00} \\ \beta_{01} &= \gamma_{010} + u_{01} \\ \beta_{10} &= \gamma_{100} + \gamma_{101} * (\text{Pre scores of the dependent variable}) + u_{10} \\ \beta_{11} &= \gamma_{110} + u_{11} \end{aligned}$$

Conditional Log-Time Model (Controlling for Pre-Scores)

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + \beta_{01} * (\text{Pre scores of the dependent variable}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} * (\text{Pre scores of the dependent variable}) + r_1 \end{aligned}$$

$$\begin{aligned} \text{Level 3: } \beta_{00} &= \gamma_{000} + \gamma_{001} * (\text{Study Condition}) + \gamma_{002} * (\text{Pre scores}) + u_{00} \\ \beta_{01} &= \gamma_{010} + u_{01} \\ \beta_{10} &= \gamma_{100} + \gamma_{101} * (\text{Study Condition}) + \gamma_{102} * (\text{Pre scores}) + u_{10} \\ \beta_{11} &= \gamma_{110} + u_{11} \end{aligned}$$

Appendix D

HLM 2-Level Models

Base Model

$$\text{Level 1: } Y = \pi_0 + e$$

$$\text{Level 2: } \pi_0 = \beta_{00} + r_0$$

Unconditional Log-Time Model

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + r_0 \\ \pi_1 &= \beta_{10} + r_1 \end{aligned}$$

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + \beta_{01} * (\text{Pre scores of the dependent variable}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} * (\text{Pre scores of the dependent variable}) + r_1 \end{aligned}$$

Conditional Log-Time Model (Controlling for Pre-Scores)

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + \beta_{01} * (\text{Study Condition}) + \beta_{02} * (\text{Pre scores of the dependent variable}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} * (\text{Study Condition}) + \beta_{12} * (\text{Pre scores of the dependent variable}) + r_1 \end{aligned}$$

Appendix E

HLM 2-Level Models for Hypotheses VII and IX

Base Model

$$\text{Level 1: } Y = \pi_0 + e$$

$$\text{Level 2: } \pi_0 = \beta_{00} + r_0$$

Conditional Log-Time Model

$$\text{Level 1: } Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

$$\begin{aligned} \text{Level 2: } \pi_0 &= \beta_{00} + \beta_{01} * (\text{BDI Slopes}) + r_0 \\ \pi_1 &= \beta_{10} + \beta_{11} * (\text{BDI Slopes}) + r_1 \end{aligned}$$

Conditional Log-Time Model with Interactions

Level 1:

$$Y = \pi_0 + \pi_1 * (\text{Log-Time}) + e$$

Level 2:

$$\pi_0 = \beta_{00} + \beta_{01} * (\text{StudyCondition}) + \beta_{02} * (\text{BDI Slopes}) + \beta_{03} * (\text{BDI Slopes} \times \text{StudyCondition}) + r_0$$

$$\pi_1 = \beta_{10} + \beta_{11} * (\text{StudyCondition}) + \beta_{12} * (\text{BDI Slopes}) + \beta_{13} * (\text{BDI Slopes} \times \text{Study Condition}) + r_1$$