WEIGHT LOSS AND BODY SHAPE EXPECTATIONS OF LAPAROSCOPIC SLEEVE GASTRECTOMY CANDIDATES IN NEWFOUNDLAND AND LABRADOR

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Weight loss and body shape expectations of laparoscopic sleeve gastrectomy candidates in Newfoundland and Labrador.

by

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ABSTRACT

Background: Laparoscopic sleeve gastrectomy (LSG) is a restrictive type bariatric surgery that promotes significant, sustainable weight loss in obese individuals (body mass index (BMI) $\geq$ 40 kg/m^2 or BMI 35.0-39.9 kg/m^2 with major comorbidity) resulting in 45-60 % excess weight loss (%EWL). Unrealistic expectations have been consistently reported in the literature of individuals seeking both non-surgical and surgical weight loss interventions. It has been argued that they may negatively impact treatment adherence and weight loss outcomes.

Purpose: To examine the postoperative weight loss and body shape expectations of LSG candidates in Newfoundland and Labrador (NL).

Methods: The 'Goals and Relative Weights Questionnaire' and 'Stunkard Figure Rating Scale' were administered to 84 consecutive LSG candidates. They reported postoperative weight loss and body shape expectations in four categories: (1) dream (whatever you wanted); (2) happy (would be happy to achieve); (3) acceptable (could accept even if not happy with); and (4) disappointed (would not view as successful in any way) before the start of a bariatric surgery education session. Body image dissatisfaction (BID) was scored.

Results: Of the 84 candidates, 69 were women and 15 were men (age 43.7 $\pm$ 8.7 years; BMI 49.0 $\pm$ 7.0 kg/m^2). Expectations for their dream (71.1 $\pm$ 11.7 kg), happy (80.0 $\pm$ 14.2 kg), acceptable (86.2 $\pm$ 17.0 kg) and disappointed (105.6 $\pm$ 21.0 kg) weights equated to higher %EWLs (88.7 $\pm$ 11.3 %EWL; 76.4 $\pm$ 12.8 %EWL; 68.2 $\pm$ 16.1 %EWL; and 40.6 $\pm$ 21.0 %EWL) than are clinically expected from LSG. %EWLs were significantly different ($p<0.05$-$p<0.003$) between all weight loss categories, except goal and dream weights. Men and women were dissatisfied with their current body image (BID score= 4.1$\pm$1.3) and had unrealistic postoperative body shape expectations.

Conclusions: There is a disconnect between the weight loss expectations of bariatric surgery candidates in NL and what can be clinically expected from LSG surgery. Body shape expectations do not correspond with evidence-based weight loss outcomes from LSG surgery.

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LIST OF ABBREVIATIONS

AGB	adjustable gastric banding
ANOVA	analysis of variance
BID	body image dissatisfaction
BMI	body mass index
GB	gastric bypass
GRWQ	Goals and Relative Weights Questionnaire
kg	kilograms
LAGB	laparoscopic adjustable gastric banding
lbs	pounds
LRYGB	laparoscopic Roux-en-Y gastric bypass
LSG	laparoscopic sleeve gastrectomy
M	mean
m	meters
mL	milliliters
MONICA	Monitoring of Trends and Cardiovascular Disease
n	sample size
NL	Newfoundland and Labrador
NL BaSCo	Newfoundland and Labrador Bariatric Surgery Cohort
p	probability value
PBIA	Pictorial Body Image Assessment
RR	relative risk

RYGB	Roux-en-Y gastric bypass
SD	standard deviation
SFRS	Stunkard Figure Rating Scale
SPSS	Statistical Package for the Social Sciences
TRPBC	Translational Research Program in Bariatric Care
USA	United States of America
WHO	World Health Organization
%EWL	percent excess weight loss

Chapter 1: Introduction

1.1 Background & Rationale

Obesity is a serious chronic condition in which an excess or abnormal amount of fat is stored in the adipose tissue (WHO Consultation on Obesity, 2000). Obese individuals are at increased health risk for the development of many associated comorbidities including hypertension, Type 2 Diabetes, cardiovascular disease, osteoarthritis, sleep apnea, certain cancers, and premature mortality (Calle, Thun, Petrelli, Rodriguez, & Heath, 1999; Picot et al., 2009; Sjöström et al., 2007).

Obesity is commonly classified according to an individual's Body Mass Index (BMI), which is weight in kilograms divided by the square of height in meters (Belle et al., 2007; Picot et al., 2009). BMI is an indirect surrogate measure of excess body weight widely used in clinical settings and epidemiological studies as a screening tool and crude measure of population-level weight status (WHO Consultation on Obesity, 2000). BMI correlates highly with direct measure of excess fat and health risk, however it should be interpreted with caution as its accuracy may vary on an individual level due to differences in fluid retention, cases of extreme height or muscle mass, ethnic differences on body composition, or the location of fat (Belle et al., 2007; Wellens, Roche & Khamis, 1996; WHO, 1995). While new obesity classifications have been proposed to replace the use of BMI as an assessment of health risk (Ashwell, 2011; Can, 2011) this measure continues to be widely used and reported in obesity research.

The prevalence of overweight and obesity in Canada is rising. An estimated 13 million Canadians are overweight or obese, mirroring a worldwide phenomenon

(Statistics Canada, 2012). Newfoundland and Labrador (NL) has the highest prevalence of overweight and obesity (47.7%) in the country. Modest weight losses of 5-10% body weight have been shown to lower obesity-related health risk (Picot et al., 2009). The complex etiology of obesity including psychological, societal, physiological, and environmental influences on energy balance make it a difficult target for intervention (Bray & Champagne, 2005). Weight loss achieved through behavioral and lifestyle modification in an attempt to address these factors has shown poor long-term durability and invariably result in weight regain and the return of health risk (Loveman et al., 2011; Sjöström et al., 2007).

Bariatric (weight loss) surgery is the only treatment currently known to promote significant, sustainable weight loss in obese Class III (BMI $\geq$ 40 kg/m^2) and medically complicated obese Class II patients (BMI 35.0-39.9 kg/m^2 with a major comorbidity) (Lau et al., 2007). The number of individuals accessing bariatric surgery for morbid obesity has increased with the development of minimally invasive (laparoscopic) surgical techniques (Canadian Agency for Drugs and Technology in Health (CADTH), 2010). Laparoscopic sleeve gastrectomy (LSG) is an irreversible, restrictive type bariatric procedure that promotes weight loss by removal of 80% of the stomach to form a small 'sleeve' (Padwal et al., 2011). This promotes weight loss by restricting caloric intake and results in improvement or resolution of certain comorbid conditions. Clinically expected percent excess weight loss (%EWL) from LSG is 45-60%, and occurs rapidly after surgery (Victorzon, 2012). LSG is currently the most common surgical treatment option for obesity in NL.

Research in overweight and obese populations has demonstrated a trend towards unrealistic expectations from weight loss interventions. The majority of weight loss expectation research has been conducted in populations seeking non-surgical weight loss therapies, and has consistently demonstrated the presence of unreasonably high weight loss expectations (Ames et al., 2005; Anderson, Lundgren, Shapiro, & Paulosky, 2003; Dutton, Perri, Dancer-Brown, Goble, & Van Vessem, 2010; Foster, Wadden, Phelan, Sarwer, & Sanderson, 2001; Foster, Wadden, Vogt, & Brewer, 1997; Masheb & Grilo, 2002; Provencher et al., 2007; Teixeira et al., 2004; Wamsteker, Geenen, Zelissen, van Furth, & Iestra, 2009). Very few studies have examined the weight loss expectations of individuals seeking bariatric surgery (Heinberg, Keating, & Simonelli, 2009; Kaly et al., 2008; Karmali, Kadikoy, Brandt, & Sherman, 2010; White, Masheb, Rothschild, Burke-Martindale, & Grilo, 2007). Studies of the American population have concluded that bariatric surgery patients have unrealistic weight loss expectations, stating weight loss outcomes considered surgically successful to be 'more than disappointing' (Heinberg et al., 2009; Kaly et al., 2008; White et al., 2007). There is a gap in the clinical literature surrounding the weight loss expectations of Canadian bariatric surgery candidates. A comprehensive review of the literature yielded one study of the weight loss expectations of bariatric surgery candidates in the Canadian healthcare context (Karmali et al., 2010). A larger sample size, and methodological differences including timing of survey administration and the type of bariatric surgery being evaluated will distinguish the present study from this previous work.

Unrealistic desired body shapes after weight loss and existing body image dissatisfaction have been observed in bariatric surgery populations (Adami, Meneghelli,

Bressani, & Scopinaro, 1999; De Panfilis et al., 2007; Dixon, Dixon, & O'Brien, 2002; Hrabosky et al., 2006; Madan, Beech, & Tichansky, 2008; Masheb, Grilo, Burke-Martindale, & Rothschild, 2006; Munoz et al., 2010; Neven et al., 2002; Sarwer, Fabricatore, Eisenberg, Sywulak, & Wadden, 2008; Song et al., 2006; Teufel et al., 2012; van Hout, Fortuin, Pelle, & van Heck, 2008). Rapid, surgically induced weight loss may be seen by patients as a vehicle to achieve their idealized body shape, thereby elevating their expectations of body shape change after surgery. The evaluation of different levels of body shape expectation used in this study is a novel approach to the analysis of body image and body image disturbance in bariatric surgery candidates. A comprehensive literature review revealed a gap in the literature surrounding the body image of bariatric surgery candidates in Canada.

It is purported that unrealistic postoperative expectations have been linked to poorer long-term outcomes, greater treatment dissatisfaction, attrition, poorer body image, lower self-esteem, and more depressive symptoms after weight loss (Dalle Grave et al., 2005; Provencher et al., 2007; Teixeira et al., 2002) although some debate still exists in the literature. These negative states may all contribute to weight regain after bariatric surgery. Weight regain is possible after LSG surgery and would negate the long-term health risk reduction used to justify the surgical risk and expense associated with this procedure. An understanding of the weight loss goals and body shape expectations of surgical candidates is therefore of critical importance to patient care and treatment outcomes, and should be included in the discussion of surgical risks and benefits. Findings in this field have already directed changes in comprehensive pre-surgical education programs (Kaly et al., 2008; Karmali et al., 2010).

The province of NL is uniquely suited to research the field of obesity and bariatric surgery. The prevalence of adult obesity in NL is 34%, or 1 in 3 adults with a BMI $\geq$ 30 kg/m^2 (Statistics Canada, 2012). This is well above the Canadian average of 23.1%. The study of obesity is therefore made more relevant and practical in NL than in other areas of the country where obesity rates are much lower. Additionally, in May 2011 NL implemented a new bariatric surgery care program to offer LSG as an intervention for obesity. The Translational Research Program in Bariatric Care (TRPBC) is a research initiative that was formed in tandem with the Bariatric Surgery Clinic at Eastern Health in response to the implementation of this new surgical program. The aim of the TRPBC is to bring together a team of researchers, healthcare providers, and policy makers to design and carry out meaningful qualitative and quantitative research projects to address gaps in the literature surrounding LSG. The TRPBC also aims to accelerate the translation of research findings to healthcare professional and decision makers to improve policy implementation and patient care (Bero et al., 1998). The Newfoundland and Labrador Bariatric Surgery Cohort (NL BaSCo) study is a prospective cohort designed by the TRPBC team to monitor long-term health, quality of life, and health care use outcomes from LSG in NL. The current cross-sectional survey study of the weight loss and body shape expectations of LSG candidates in NL is another product of this collaboration.

1.2 Purpose

The purpose of this study was to investigate the postoperative weight loss and body shape expectations of potential LSG candidates in NL. Secondarily, it was to

examine the impact of current weight on the lives of surgical candidates, the importance of factors in setting weight loss goals, and critical points of weight gain in patients' lives.

1.3 Research Questions

The current study was designed to answer the following questions in a sample of adults (≥ 19 years of age) eligible for LSG surgery (BMI ≥ 40 kg/m^2 or BMI 35-39.9 kg/m^2 with a serious comorbidity) in the province of NL (referred to the Bariatric Surgery Clinic at Eastern Health NL, and in attendance at a mandatory pre-surgical education session).

1. What is the self-reported demographic and obesity-related comorbidity profile of bariatric surgery candidates in NL?
2. What are weight loss expectations, impacts of current weight on life, critical periods of weight gain, goal weight choice influences, and time to weight loss and achievement beliefs of LSG candidates in NL based on the reports of the Goals and Relative Weights Questionnaire?
3. What are the body shape expectations and body image dissatisfaction of LSG candidates in NL based on the reports of the Stunkard Figure Rating Scale?

Chapter 2: Literature Review

The purpose of this literature review is to review and summarize the gaps in the clinical literature on the weight loss and body shape expectations of bariatric surgery patients. The review of relevant literature is divided into major three sections. The first section presents an overview of the epidemiology of obesity, obesity and health risk, and bariatric surgery. Special consideration is given to the NL context in each of these areas. The second section reviews the literature on the weight loss expectations of bariatric surgery candidates and patients, focusing on studies in bariatric surgery populations using the Goals and Relative Weights Questionnaire (GRWQ). The final section reviews the literature on the body shape expectations, body image, and body image dissatisfaction of bariatric surgery candidates, focusing on studies in bariatric surgery populations using the Stunkard Figure Rating Scale (SFRS).

2.1 Epidemiology of Obesity

2.1.1 Global obesity trends. Obesity prevalence is increasing at an alarming rate in both developed and developing nations (Padwal et al., 2011; Picot et al., 2009; Stevens et al., 2012; WHO Consultation on Obesity, 2000). In 1997, the World Health Organization (WHO) formally recognized obesity as a global epidemic. As of 2008, 1.4 billion adults over the age of 20 years, approximately 1 in every 10 adults worldwide, were considered to be overweight or obese. The global age-standardized prevalence of obesity (BMI $\geq$30 kg/m^2) nearly doubled from 6.4% in 1980 to 12.0% in 2008 (Stevens et al., 2012). Half of this rise occurred in the 8 years from 2000 to 2008, indicating that

obesity rates not only increased but also accelerated compared to previous growth rates. The global prevalence of overweight (BMI 25-29.9 kg/m^2) also increased during this 28-year period from 24.4% to 34.4%.

Obesity rates vary by country. Stevens and colleagues (2012) noted in their review of obesity trends in 199 countries that although obesity tended to increase in most countries, there was substantial variation between countries and within regions. In a comparison of the most recent adult BMI data available for WHO monitored countries Vietnam (0.5%), India (0.7%), and Lao People's Democratic Republic (1.2%) were found to have the lowest percentage of obese adults (WHO, 2012a). Nauru (78.5%), American Samoa (74.6%), and Tokelau (63.4%) were found to have the highest percentage of adults with BMI ≥ 30 kg/m^2. The WHO Monitoring of Trends and Cardiovascular Disease (MONICA) study found that industrialized countries such as the United States of America (USA), New Zealand, and Canada tended to have a higher prevalence of overweight and obesity than developing nations (WHO, 2012b). In nations undergoing major socioeconomic transitions, such as Brazil, obesity coexisted with underweight (<18.5 kg/m^2) and was more likely to occur in urban than rural areas. The MONICA report also noted that women generally have higher rates of obesity than men, however men may have higher rates of overweight (WHO Consultation on Obesity, 2000).

2.1.2 Obesity in Canada. Obesity in Canada is rising, reflecting the global trend. Over 13 million Canadians are considered to be overweight or obese, indicating that approximately 6 in 10 Canadian adults are at increased health risk due to excess weight (Shields & Tjepkema, 2006; Statistics Canada, 2012). The most recent self-reported

height and weight data available for the Canadian population indicates that 60.1% of males and 44.2% of females in this country are overweight or obese (Statistics Canada, 2012). There was more than a two-fold increase in the prevalence of obesity from 10.6% in 1971 to 23.1% in 2004 (WHO, 2012b). The WHO ranks Canada as the nineteenth most obese country in the world between Mexico (23.6%) and Israel (22.9%). The USA is ranked the ninth most obese country globally, with a reported prevalence of 33.9% obese adults.

The prevalence of obesity among Canadian adults varies substantially by province and region. Further analysis of the 2004 Canadian Community Health Survey by Shields and colleague (2006) showed that British Columbia (19.0%) and Quebec (22%) had lower obesity prevalence than the national average (23.1%). On the other hand, NL (34%), Saskatchewan (31%), New Brunswick (29%), and Manitoba (28%) had higher rates of obesity. Canadian adults living in population centers (population $\geq$ 100,000 persons) were found less likely to be obese than their rural counterparts. Obesity rates were lowest in the country's largest metropolitan areas. For example, the obesity prevalence in Toronto and Vancouver were 16% and 12% respectively, almost half the national average. Shields and colleague (2006) suggested that factors such as commuting, urban sprawl, and immigration influence the likelihood of obesity in different regions of Canada.

2.1.3 Obesity in Newfoundland & Labrador. NL has the most overweight and obese population in the country. In NL almost half (47.7%) of the population is considered to be overweight or obese according to self-reported height and weight data

(Statistics Canada, 2012). The prevalence of obesity alone in NL is 34%, or 1 in 3 adults with a BMI $\geq$ 30 kg/m^2. The Canadian trend of population centers having a lower rate of obesity did not hold true in NL (Shields & Tjepkema, 2006). That is, Newfoundlanders and Labradorians living in population centers were just as likely as their rural counterparts to be overweight or obese.

2.2 Obesity & Health Risk

2.2.1 Etiology of obesity. The etiology of obesity involves a complex set of behavioral, environmental, socioeconomic, genetic, and medical factors. Obesity is characterized by the storage of an excess or abnormal amount of fat in the body tissues (WHO Consultation on Obesity, 2000). This occurs as a result of chronic positive energy imbalance wherein energy intake exceeds energy expenditure (Hill, Catenacci, & Wyatt, 2006). The relationship between body weight, energy intake, and energy output can be seen in the following equation. Although the formula indicates a simple in-out relationship, this is a complex and dynamic relationship. Any number of factors may influence energy intake or expenditure, and changes in either can promote changes in body weight. Excess weight is a complex chronic condition.

$$\text{Energy}_{\text{in}} - \text{Energy}_{\text{out}} = \Delta \text{ Body Weight}$$

In their 2009 paper, Sharma and Padwal suggested an etiological framework for obesity that included a systematic assessment of factors that influence metabolism, energy intake, and physical inactivity. The authors identified that an individual's metabolic rate

(resting energy expenditure) may be influenced by their age, gender, genetics, neuroendocrine factors, prandial thermogenesis, brown fat, sarcopenia, previous weight loss history, or medication use. Increased energy intake was suggested to be influenced by knowledge deficit, sociocultural factors, saboteurs, mindless eating, physical hunger, emotional eating, sleep deprivation, or medication profile. Weight gain was also related to physical inactivity influenced by physical limitations, sociocultural factors, chronic pain, musculoskeletal pain, cardiorespiratory comorbidity, psychiatric disorders, mental barriers, and medication use. Sharma and Padwal (2009) suggest that modification of behavioral factors like diet and physical activity are clearly insufficient to address the complex etiology of weight gain in our society.

2.2.2 Obesity-related health risk. Obesity is a severe chronic condition and a major risk factor for the development of many health disorders. Well-evidenced comorbidities include hypertension, Type 2 Diabetes, cardiovascular disease, osteoarthritis, sleep apnea, certain cancers, and premature mortality (Calle et al., 1999; Picot et al., 2009; Sjöström et al., 2007). This burden of illness is debilitating in nature and negatively impacts individuals' quality of life (Kolotkin et al., 2003). Obesity has also been negatively associated with mental, emotional, and psychosocial health (McElroy et al., 2004; Sarwer et al., 2008; Sarwer, Lavery, & Spitzer, 2012; Wee, Davis, Huskey, Jones, & Hamel, 2012).

The severity of obesity related health risk varies with body weight. Obesity health status is commonly classified according to an individual's BMI, which is their weight in kilograms divided by the square of their height in meters (Belle et al., 2007; Picot et al.,

2009). The severity of health risk increases as an individual's BMI increases (Table 2.1). Calle and colleagues (1999) observed that this association follows a U-shaped distribution. According to this study, men and women are at increased relative risk of death in the severely underweight and obese BMI categories. For obese persons, this relative risk of death was observed to be more than two-fold that of people with normal range BMIs. Results from a national longitudinal study of Canadian adults found that being in obese Class II or above was associated with significantly increased risk of mortality (RR = 1.36, $p < 0.05$) over 12 year follow-up (Orpana et al., 2009). In addition to increased health risk at higher BMIs, it has been shown that overweight and obese Class I individuals are more likely to progress to a higher obese category than to return to a normal range of weight in their lifetime (Statistics Canada, 2012; Twells, 2010).

Table 2.1

BMI classification and risk of comorbidities

BMI (kg/m^2)	Health Canada Classification	Risk of comorbidities *
<18.5	Underweight	Increased
18.5-24.9	Normal weight	Average
25-29.9	Overweight	Increased
30-34.9	Class I obese	Moderate
35-39.9	Class II obese	Severe
≥40	Class III obese	Very severe

Note: * WHO Consultation on Obesity, 2000

Complications associated with obesity may arise in the cardiovascular, gastrointestinal, integumental, musculoskeletal, genitourinary, neurologic, psychosocial, and respiratory systems (Lau et al., 2007). Excess weight has a negative impact on many of these systems via insulin resistance, which is a major contributor to the development of comorbidity in obese persons. Type 2 Diabetes is recognized as one of the most serious complications of obesity. There is a linear relationship between BMI $\geq$30 kg/m^2 and risk of diabetes (Anvari, 2007). Factors such as insulin resistance in peripheral tissues, increased levels of free fatty acids, and increased hepatic output contribute to systematic hyperinsulinemia leading to Type 2 Diabetes. In women, insulin resistance is associated with polycystic ovarian syndrome, a serious medical condition known to increase risk of heart disease and metabolic abnormalities. Metabolic syndrome is a medical state characterized by increased visceral fat and insulin resistance. Individuals in this state are at increased risk of developing Type 2 Diabetes and cardiovascular disease.

Hyperlipidemia and hypertension are also common comorbidities in the obese population. Obese persons typically have low levels of high-density lipoprotein and high levels of triglycerides. Hypertension often results from the combination of insulin resistance, increased levels of the hormone aldosterone, and salt sensitivity. Other recognized obesity related comorbidities include obstructive sleep apnea, increased risk of endometrial, breast, prostate, and colon cancers, nonalcoholic fatty liver disease, osteoarthritis, gallbladder disease, skin changes, and neurological phenomena including benign intracranial hypertension (WHO Consultation on Obesity, 2000).

Obesity has been associated with psychiatric and mood disorders. The psychosocial pressures of prejudice, bias, and stigmatization associated with excess

weight negatively impact the mental and emotional health of obese individuals (Sarwer et al., 2008; Wee et al., 2012). A systematic review of the literature surrounding obesity and mental disorders found that overweight and obesity are common in persons seeking treatment for mood disorders (Lau et al., 2007; McElroy et al., 2004). Conversely, mood disorders are also common in people of all ages seeking obesity treatment, particularly for severe obesity. This review found evidence in the literature to support an association between obesity and major depressive disorders, especially in women. McElroy and colleagues (2004) indicated that more randomized controlled trials are needed to examine the effect of treatment of depression on obesity. They also noted that obesity and mood disorders could be characterized by similar behavior including physical inactivity, overeating, and weight gain. Evidence was presented that people with bipolar disorder may be at increased risk of being overweight or obese. Mood disorders were found to impact an individual's adherence to obesity treatment and prevention measures. A variety of typical and atypical anti-psychotic medications used to treat mood disorders have been linked with drug-associated weight gain (Malhi & Mitchell, 2003).

Binge-eating disorder has been associated with overweight and obesity (Lau et al., 2007; Picot et al., 2009). Eating disorders are often cited as barriers to weight management and represent important targets in the treatment and management of overweight and obese individuals. Stunkard and colleagues (2003) noted in their systematic review of the literature that the prevalence of binge-eating disorder is as high as 10-20% in the obese population. Binge-eating disorder may be associated with dieting, weight cycling, and psychological functioning. Obese people with binge-eating disorder are at increased risk of major depressive disorders (Picot et al., 2009). It remains unclear

whether or not binge-eating disorder influences the outcome of weight management programs. More rigorous studies of binge-eating disorder in overweight and obese patients are warranted.

Obesity is also associated with increased mortality. The Swedish Obesity Study is a rigorous prospective matched control study designed to evaluate the effects of bariatric surgery on mortality (Sjöström et al., 2007). This study followed more than 4047 obese subjects over an average of 10.6 years. Over this time period 2010 subjects underwent bariatric surgery and significant weight loss, while control subjects experienced an average weight change of ± 2%. Survival analysis found an overall hazard ratio of 0.76 ($p=0.04$) in the bariatric surgery weight loss group compared to the obese control group (Sjöström et al., 2007), indicating there is a higher hazard of death from conventional treatment then bariatric surgery. This research provides evidence that obesity is associated with premature mortality, and that this risk can be lessened by long term, sustainable weight loss.

Modest weight losses can be beneficial to health and lower obesity-related health risk. The 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children advocate modest weight losses of 5-10% body weight to reduce health risk and improve comorbid conditions (Lau et al., 2007). Sustained weight loss is the most effective method of resolving obesity related comorbidities and has been shown to increase longevity and vitality (Anvari, 2007; Belle et al., 2007; Picot et al., 2009). A systematic review of the clinical effectiveness of long term weight management interventions showed that while non-surgical interventions commonly promote weight loss, weight changes are small and weight regain is frequent (Loveman et al., 2011).

2.3 Bariatric Surgery

Bariatric (weight loss) surgery is the only therapy currently known to promote significant, sustainable weight loss in obese individuals. There are an increasing number of bariatric surgeries of all types being performed in Canada and an increasing population of eligible candidates. Obese Class III (BMI $\geq$ 40 kg/m^2) and medically complicated obese Class II patients (BMI 35.0-39.9 kg/m^2 with a major comorbidity) failing non-surgical weight loss therapies are eligible for bariatric surgery (Lau et al., 2007).

There are several different types of bariatric surgery. All bariatric surgeries fundamentally involve alteration of the digestive system in either a restrictive, malabsorptive, or combination restrictive/ malabsorptive capacity to induce rapid and sustainable weight loss (Belle et al., 2007; Lau et al., 2007; Padwal et al., 2011; Picot et al., 2009; Stefater, Wilson-Pérez, Chambers, Sandoval, & Seeley, 2012). Restrictive type bariatric procedures impose a physical limitation on the amount of food, and thereby calories, that can be consumed by reducing gastric volume. Sleeve gastrectomy, horizontal gastroplasty, vertical banded gastroplasty and adjustable gastric banding are restrictive type bariatric surgeries. Malabsorptive procedures restrict nutrient and calorie absorption in the small intestine and include the jejunoileal bypass, and biliopancreatic diversion/ duodenal switch. Other bariatric surgeries use a combination of restriction and malabsorption to promote weight reduction. The Roux-en-Y gastric bypass (RYGB), loop gastric bypass, and mini-gastric bypass are mixed type procedures. The most commonly performed operations are adjustable gastric banding (42.3%), RYGB (39.7%), and sleeve gastrectomy (4.5%) (Buchwald & Oien, 2009). The majority (90%) of bariatric surgeries are performed laparoscopically, through small incisions ports in the

abdomen. This minimally invasive approach reduces surgical risk, hospital stay, and recovery time and has contributed to the increasing popularity of this intervention (CADTH, 2010).

Each type of bariatric surgery is associated with a range of clinically expected weight loss (Picot et al., 2009). While there is no standardized means of reporting the range of expected weight reduction from bariatric surgery, the scientific literature commonly reports it as the %EWL (Montero, Stefanidis, Norton, Gersin, & Kuwada, 2010). Percent excess weight loss (%EWL) is defined as an individual's current weight minus their expected weight after weight loss divided by their current weight minus their ideal body weight all multiplied by 100, as indicated in the following formula.

$$\%EWL = [\text{current weight} - \text{expected weight after weight loss}] \div [\text{current weight} - \text{ideal body weight}] \times 100$$

An individual's ideal body weight is the weight at which they would carry no excess weight. This number is based on the 1983 Metropolitan Height and Weight Tables, which define ideal body weight based on height and frame size ("1983 metropolitan height and weight tables," 1983). For example, a woman of medium frame size and 5'5" tall has an ideal weight of 134 pounds (lbs) according to the 1983 Metropolitan Height and Weight Tables. If she weighed 250 lbs and wanted to lose half of her excess weight, undergo a 50 %EWL, she would need to lose 58 lbs. Potentially, one could misinterpret a 50 %EWL to be equivalent to a 50% total body weight loss. This misunderstanding

would be equivalent to the woman in the previous example expecting to lose 125 lbs instead of 58 lbs from her weight loss intervention.

Roux-en-Y gastric bypass is considered the 'gold standard' of bariatric surgery as it induces the highest %EWL, approximately 80% (Picot et al., 2009). The %EWL from every other type of bariatric surgery is lower than that of RYGB. The clinically expected percent excess weight loss for LSG is 45-60% EWL. Patients unable to achieve weight reduction within the expected range of %EWL of their bariatric surgery procedure are considered to have failed treatment, and may not experience obesity-related health risk reduction (Victorzon, 2012). Strict diet and exercise regimes after surgery can make it possible for patients to achieve even greater weight losses than what are considered clinically successful. Lifestyle modification, including strict diet and recommended physical activity, are already postoperatively required of all bariatric surgery patients.

There are a rising number of bariatric surgeries being performed worldwide. Buchwald and Oien (2009) estimated almost 350,000 bariatric surgeries were performed globally in 2008. The majority (220,000 operations) were performed in the USA/Canada. Comparatively, fewer than 5,000 bariatric surgeries were performed in the USA/Canada from 1987-1989 (Padwal et al., 2011). The absolute growth rate of bariatric surgery rose by 135% from 2003 to 2008. Despite these astonishing figures bariatric surgery is performed on less than 1% of morbidly obese patients worldwide.

LSG is currently the most common surgical treatment option for obesity in NL. LSG began as the first stage of a two-tiered operation of duodenal switch or RYGB for super obese (BMI $\geq$ 50 kg/m^2), high-risk patients (Lau et al., 2007; Picot et al., 2009; Victorzon, 2012). The technical simplicity, comorbidity resolution, and good short-term

weight loss outcomes associated with LSG have led it to become a stand-alone bariatric surgery. In this procedure, the greater curvature and fundus of the stomach are surgically resected leaving a tube or stomach 'sleeve'. This sleeve has a volume of 60-100 mL, effectively restricting caloric intake and increasing feelings of satiety. Removal of the fundus has also been associated with endocrine and metabolic effects (Padwal et al., 2011). For example, circulating levels of the "hunger hormone" grehlin are reduced following LSG. It is not yet fully understood how LSG creates favorable metabolic changes and weight loss.

In a recent systematic review of the literature Victorzon (2012) noted that the quantity, quality, and consistency of evidence for LSG for obesity is low. Numerous 1-3 year studies have shown that LSG has good short-term outcomes of between 45-60% EWL, however no studies ≥5 years with >100 patients have been published, or perhaps had time to reach this milestone (Victorzon, 2012). Small case series and retrospective cohort studies have been undertaken and suggest that weight regain may occur more than six years after LSG. The reviewer noted that there is a definite need for rigorous long-term randomized controlled trials to support the use of LSG as a definitive weight loss therapy. If weight loss, comorbidity resolution, and quality of life outcomes are shown to be sustained in the long-term LSG may surpass laparoscopic RYGB as the bariatric procedure of choice due to its increased simplicity, and reduced risk of nutrient deficiencies and surgical risks.

2.3.1 Bariatric surgery in Newfoundland and Labrador. In May of 2011 the Eastern Health Regional Health Authority of NL, Canada introduced LSG as one surgical

treatment option for morbid obesity in the province. Within Eastern Health the Bariatric Surgery Clinic, including two bariatric surgeons, a nurse practitioner, physical therapist, and a dietician, was established to provide 70-100 LSG surgeries per year. As of December 2012, the bariatric surgery program at Eastern Health recruited a third bariatric surgeon and the estimated number of surgeries per year will be 150.

2.4 Weight Loss Expectations

2.4.1 Evaluation of weight loss expectations. For many years, the goal of obesity treatment was to reduce body weight to achieve an ideal size defined by height and weight charts ("1983 metropolitan height and weight tables," 1983; Foster et al., 1997; Kincey, 1980). There was a paradigm shift in the early 1990s, when major research and governing bodies began to recommend modest, sustained weight losses of 5-10% total body weight to improve health (Brownell & Wadden, 1991). Establishing weight loss goals based on reasonable rather than ideal weights became the focus of healthcare professionals as they began to recognize the complex etiology of obesity and the compelling evidence that modest weight loss improved obesity-related comorbidities. Foster and colleagues (1997) realized that while this knowledge translation was happening in the professional world, there was a lack of information about patients' views of goal weights, expectations for weight loss therapy, and evaluations of treatment outcomes. In response, they developed and validated the GRWQ through a combination of clinical experience and structured interviews with clinical patients to assess patients' weight loss goals and expectations.

The GRWQ was the first instrument designed to evaluate the psychosocial goals and motivations of individuals seeking weight loss treatment. Broadly, weight loss expectations encompass any perceptions held by an individual seeking and/ or experiencing weight loss regarding their weight loss experience and outcomes (Crawford & Glover, 2012). The GRWQ was designed in two parts to assess patients' expectations and evaluations of obesity treatment. In Part I participants reported their goal weight and current weight in pounds and described the impact of these weights on 20 factors related to health, quality of life, social functioning, aesthetic features, and self-image on a 1-10 Likert scale (1=extremely negative; 10=extremely positive). Part II of the questionnaire asked participants to numerically define their weight loss expectations in four categories "dream", "happy", "acceptable", and "disappointed". Each of these categories was preceded by a prompt describing the category (Table 2.2). For example when asked to report their "happy" weight participants were prompted, "This weight is not as ideal as your dream weight. It is a weight, however, that you would be happy to achieve from weight loss surgery". The wordings of these weight loss expectation definitions have been modified for use in a variety of surgical and non-surgical weight loss populations (Ames et al., 2005; Kaly et al., 2008; Masheb & Grilo, 2002; Provencher et al., 2007).

Much of the literature is inconsistent with regard to the definition and questions asked to determine weight loss expectations. Weight loss expectations are often introduced with a specific definition to ascertain an individual's thoughts and feelings about a particular weight state of interest. For example, in their 2007 study of male bariatric surgery patients' perceptions of weight loss Walfish and colleagues asked participants "How much weight would you like to lose at this time?" and "If you are

successful in our program …how much weight do you realistically expect to lose in 12 months?". Fabricatore and associates (2008) asked overweight and obese telephone survey respondents about their dieting history, and asked "Realistically, how many pounds will you lose in your next diet attempt?" and "Ideally, how many pounds do you want to lose?". Both of these authors sought to inquire about participants' goal weight and ideal/ dream weights, unfortunately in this unstandardized format the findings of these two studies are difficult to accurately compare. The most consistently applied definitions of weight loss expectations identified in this review derive from Part II of the GRWQ. For this reason, only studies using the GRWQ will be assessed in this literature review.

Table 2.2

Weight loss expectation category descriptions

Weight loss expectation	Description
Dream	A weight that you would choose if you could weigh whatever you wanted after weight loss surgery.
Happy	This weight is not as ideal as your dream weight. It is a weight, however, that you would be happy to achieve from weight loss surgery.
Acceptable	A weight that you would not be particularly happy with, but one that you would accept after weight loss surgery, since it is less than your current weight.
Disappointed	A weight that is less than your current weight, but one that you could not view as successful in any way. You would be disappointed if this was your final weight after weight loss surgery.

2.4.2 Weight loss expectations in non-bariatric surgery populations. The majority of weight loss expectation research has been conducted in non-surgical weight loss populations. These studies have used prospective and cross-sectional survey designs to examine a variety of weight loss expectation outcomes in normal weight, overweight, and obese populations. Collectively, this work has provided evidence for the disparity between patient and therapy provider expectations of weight loss outcomes. This literature review will focus on studies using all or part of the GRWQ, the survey instrument employed in this research initiative. The literature on weight loss expectation studies in non-surgical weight loss populations is summarized in Table 2.3, and briefly reviewed below.

The GRWQ was first administered in a prospective survey study paralleling a clinical trial of diet and exercise (Foster et al., 1997). Sixty obese women who were recruited to participate in the clinical trial completed the GRWQ before treatment, upon reaching their self-reported disappointed weight, and at the end of the 48-week program. Data were collected in a separate population of 46 obese women seeking obesity treatment to psychometrically test and validate the questionnaire. This evaluation found satisfactory reliability coefficients for the GRWQ, with one-week test re-test reliability of $r>0.96$ ($p<0.0001$) for all 4 weight loss categories, and $r=0.60$-0.82 ($p<0.001$) for the 21 factors effected by weight loss and determined the tool to be psychometrically sound. The authors concluded that there was a great disparity between patients' perceptions and practitioners' recommendations of weight loss treatment outcomes, effectively setting the stage for decades more research in this area. They also suggested that unrealistic

expectations might impact adherence, attrition, and outcomes from weight loss treatment programs.

Foster and colleagues (2001) followed up on their preliminary weight loss expectations research with a cross-sectional survey study designed to investigate the role of physical characteristics, treatment approach, and mood on weight loss outcome expectations. Three hundred and ninety-seven obese patients seeking weight loss by a variety of modalities completed a battery of self-report questionnaires, including Part II of the GRWQ, as part of their pre-treatment assessment. Participants reported dream, happy, acceptable, and disappointed weights of 64.4 ± 11.1 kg, 72.9 ± 12.7 kg, 79.6 ± 14.6 kg, and 90.1 ± 19.1 kg respectively. Patients considered outcomes from the best available weight loss measures to be "less than disappointing". The most unrealistic expectations were observed in the patients with the highest pre-treatment weight.

Masheb and Grilo (2002) employed a cross-sectional survey study design to examine the weight loss expectations of patients seeking treatment for binge eating disorder and to determine whether weight loss expectations varied by gender or treatment motivation. Binge eating disorder patients enrolling in a clinical trial (n=130) completed Part II of the GRWQ as part of their screening process. The authors reported that in order to achieve their dream, happy, acceptable, and disappointed BMIs participants would have to lose 36%, 29%, 23%, and 14% of their total body weight respectively. They also noted that this was 1.5 to 3 times greater than expert recommended 5-10% body weight loss. They concluded that binge eating disorder patients have very unrealistic weight loss expectations that are independent of sex or motivation for seeking treatment.

Anderson and colleagues (2003) designed a cross-sectional survey study to explore the goal weights of normal weight and overweight college-age participants. They recruited 379 college students to complete a short survey, including Part II of the GRWQ, in exchange for course credit. Weight loss goal and expectation results were analyzed by gender (Table 2.3). It was observed that normal weight and overweight college-aged individuals have reasonable weight loss expectations. Overweight women had the most extreme weight loss goals and expectations in this sample, however even these were more reasonable than findings reported in studies of older treatment seeking obese persons.

Teixeira and associates (2004) employed a prospective survey design to investigate pretreatment predictors of short-term weight loss. Part II of the GRWQ was administered cross-sectionally before the start of a 4-month weight loss intervention in Portugal. This was part of a larger assessment protocol completed by 130 healthy overweight and obese women. Previous dieting, body image, and pretreatment motivation were identified as pretreatment predictors of weight loss. The authors observed that Portuguese women have excessive weight loss expectations, but that these expectations are less extreme than those seen in their American counterparts. They suggested that weight outcome evaluations display a complex relationship with treatment results and that culture-specific factors may explain some of this pattern of association.

Ames and colleagues (2005) examined a cognitive-behavioral intervention versus a standard behavioral weight loss program to change expectations and motivations for weight loss. In this randomized pilot study, 28 overweight and obese college women completed Part II of the GRWQ and numerous other survey tools over three treatment

phases. Participants reported dream, happy, acceptable, and disappointed percent total body weight losses of 28.3 ± 6.2 %, 21.7 ± 8.1 %, 15.9 ± 7.1 %, and 9.9 ± 7.3 % respectively at baseline. The authors concluded that a reformulated cognitive behavioral program designed to reduce weight loss expectations was effective, but had no significant effect on weight loss or maintenance achieved by participants compared to standard behavioral intervention models.

Provencher and associates (2007) used Part II of the GRWQ as a component of a larger prospective study designed to examine associations between weight loss expectations and anthropometric profile. Overweight and obese premenopausal women were recruited via newspaper and internet ads to participate in a behavioral weight loss intervention study. A cross-sectional evaluation of baseline surveys revealed dream, happy, acceptable, and disappointed weights of 60.6 ± 6.0 kg (24.2 %), 65.2 ± 6.4 kg (18.6 %), 67.9 ± 6.8 kg (15.2 %), and 74.0 ± 8.5 kg (7.8 %) respectively. The authors found that more realistic expectations were associated with healthier psychological and eating behavior profiles.

Dutton and colleagues (2010) employed a cross-sectional survey design to investigate the weight loss expectations of 143 overweight and obese patients at a group behavioral weight loss program. This research was undertaken in a managed care setting and the relationship between patient goals and physicians' counseling for weight loss was also examined. Participants completed healthcare and weight loss expectation questionnaires in the clinic before the initial weight loss session. Participants reported dream weights of 68.2 ± 11.4 kg (30.9 %), happy weights of 74.3 ± 13.6 kg (25.2 %), acceptable weights of 80.3 ± 17.4 kg (19.7 %), and disappointed weights of 90.2 ± 21.4

kg (10.4 %). The authors concluded that patients in a managed care setting also have unrealistic weight loss expectations. They also observed that more contact with primary care providers was associated with more realistic weight loss goals.

Finally, Wamsteker and associates (2009) conducted a cross-sectional survey study in the Netherlands to examine the frequency of unrealistic goals as they relate to patient characteristics. Part II of the GRWQ and other surveys were administered to 90 obese individuals seeking professional dietary treatment at a university outpatient clinic. The authors observed discrepancies in the weight loss goals of patients and professionals in their sample and recommended that weight management programs may be improved by addressing unrealistic weight loss goals before treatment starts.

In summary, studies of weight loss expectations in non-bariatric surgery populations have consistently demonstrated the presence of unreasonably high weight loss expectations. The gap between patient and provider expectations of weight loss has been highlighted in a number of different studies involving a variety of weight loss interventions and populations. This consistency has been observed despite differences in the sample size, country of origin, study design, and purpose of these research initiatives.

Table 2.3

Summary of weight loss expectation studies in non-bariatric surgery populations using the Goals and Relative Weights Questionnaire

Study	Design & Sample	Purpose	Weight loss expectations	
Foster et al. (1997)	Prospective survey; 60 obese women	Examine patients' goals, expectations, and evaluations of obesity treatment.	Dream weight: 61.4 ± 6.8 kg Happy weight: 68.0 ± 7.7 kg Acceptable weight: 74.2 ± 8.6 kg Disappointed weight: 81.9 ± 10.1 kg	
Foster et al. (2001)	Cross-sectional survey; 397 obese patients seeking outpatient or surgical weight loss therapy	Examine the role of physical characteristics, treatment approach, and mood on outcome expectations.	Dream weight: 64.4 ± 11.1 kg Happy weight: 72.9 ± 12.7 kg Acceptable weight: 79.6 ± 14.6 kg Disappointed weight: 90.1 ± 19.1 kg	
Masheb & Grilo (2002)	Cross-sectional survey; 130 binge eating disorder patients	Examine weight loss expectations in patients seeking treatment for binge eating disorder and determine whether weight loss expectations vary by gender or treatment motivation.	Dream BMI: 23.0 ± 3.3 kg/m^2 Happy BMI: 25.5 ± 3.9 kg/m^2 Acceptable BMI: 28.0 ± 4.7 kg/m^2 Disappointed BMI: 31.8 ± 6.8 kg/m^2	
Anderson et al. (2003)	Cross-sectional survey; 379 college students (216 women, 163 men)	Examine goal weights in normal and overweight college-age participants not seeking weight loss treatment.	Women Goal weight: 56.8 ± 8.4 kg Dream weight: 54.5 ± 7.4 kg Happy weight: 58.4 ± 9.3 kg Acceptable weight: 60.8 ± 10.1 kg Disappointed weight: 64.3 ± 12.4 kg	Men Goal weight: 80.4 ± 13.4 kg Dream weight: 81.8 ± 12.8 kg Happy weight: 79.8 ± 14.1 kg Acceptable weight: 79.4 ± 15.6 kg Disappointed weight: 82.4±24.2 kg

Teixeira et al. (2004)	Cross-sectional survey; 140 healthy overweight and obese women	Examine pretreatment predictors of short-term weight loss.	Data not given.
Ames et al. (2005)	Prospective survey; 28 overweight and obese college women	Examine a cognitive-behavioral intervention versus a standard behavioral weight loss program to change expectations and motivations for weight loss.	Dream weight loss: 28.3 ± 6.2 % Happy weight loss: 21.7 ± 8.1 % Acceptable weight loss: 15.9 ± 7.1 % Disappointed weight loss: 9.9 ± 7.3 %
Provencher et al. (2007)	Cross-sectional survey; 153 overweight or obese premenopausal women	Examine associations between weight loss expectations and anthropometric profile.	Dream weight: 60.6 ± 6.0 kg (24.2 %) Happy weight: 65.2 ± 6.4 kg (18.6 %) Acceptable weight: 67.9 ± 6.8 kg (15.2 %) Disappointed weight: 74.0 ± 8.5 kg (7.8 %)
Dutton et al. (2010)	Cross-sectional survey; 143 overweight or obese managed care patients	Examine weight loss expectations of overweight and obese patients at a group behavioral weight loss program.	Dream weight: 68.2 ± 11.4 kg (30.9 %) Happy weight: 74.3 ± 13.6 kg (25.2 %) Acceptable weight: 80.3 ± 17.4 kg (19.7 %) Disappointed weight: 90.2 ± 21.4 kg (10.4 %)
Wamsteker et al. (2009)	Cross-sectional survey; 90 obese patients seeking professional outpatient dietary treatment	Examine the frequency of unrealistic goals as they relate to patient characteristics.	Data not given.

Note: %= Percentage of total body weight.

2.4.3 Weight loss expectations in bariatric surgery populations. Very few studies have examined the weight loss expectations of bariatric surgery patients. This gap in the literature is particularly apparent in relation to LSG, which is a relatively new type of bariatric procedure. A search of the literature revealed only four studies that have investigated the weight loss expectations of individuals seeking bariatric surgery using the GRWQ (Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; White et al., 2007). The quality of these studies and their relevance to the weight loss goals and expectations of LSG candidates in NL was highly varied. Only one study of the weight loss expectations of bariatric surgery candidates has been conducted in the Canadian healthcare context. A critical appraisal of these four studies can be found below, with a summary in Table 2.4.

2.4.3.1 White et al. (2007). The aim of this study by White and colleagues (2007) was to examine if weight goals change after substantial weight loss from bariatric surgery. These researchers also sought to investigate the impact of unrealistic pretreatment weight loss goals on final weight loss and associated psychological or behavioral benefits, as well as to perform an exploratory analysis for the strongest predictor of goal weight. This was studied using a prospective cohort design.

Extremely obese patients scheduled to undergo gastric bypass (GB) surgery were consecutively recruited into this cohort. Inclusion criteria were well described. Informed consent procedures were well documented. A total of 139 patients completed a battery of assessment surveys at baseline, 6 months, and 12 months after GB surgery. This survey assessment included questions from Part II of the GRWQ asking participants to report

their dream, happy, acceptable and disappointed weights. Healthcare professionals measured participants' height and weight at each time-point, alleviating potential measurement bias. Recall bias may have impacted the results of the self-reported survey data, however this bias is inherent in all survey studies. There was no justification of the sample size provided, however no loss to follow-up was reported and strict sample size calculations are generally not required for observational studies.

The authors observed that the discrepancies between patients' actual weights and their weight loss expectations were much greater than that generally obtained through GB surgery (~35%). The percent total body weight loss necessary to achieve participants' dream, happy, acceptable, and disappointed weights were 52.6%, 45.2%, 38.2%, and 26.0% respectively. Repeated measures analysis controlling for baseline BMI revealed no significant differences between the weight loss expectations reported at baseline, 6 months, and 12 months post-surgery. Weight loss expectations did not predict weight loss at follow-up and unrealistic goals were unrelated to psychological functioning and improvements in eating behavior after surgery. The authors noted that individuals' weight loss expectations appeared to parallel health professional weight recommendations.

This study was mainly limited by its low generalizability to populations other than treatment seeking extremely obese individuals in an urban USA medical center. All survey data were self-reported, creating potential recall bias. The study findings could have been strengthened with longer-term follow-up as studies have shown that a weight regain and plateau phase may occur 2 to 10 years after bariatric surgery. In general, this

study appeared to be methodologically sound, well analyzed and reported, and free from avoidable sources of bias.

2.4.3.2 Kaly et al. (2008). The purpose of this study by Kaly and colleagues (2008) was to investigate the weight loss expectations of candidates for bariatric surgery, and to determine factors affecting patient's perceptions of success. This was examined using a cross-sectional survey design. A population of bariatric surgery candidates attending pre-surgical education for GB surgery or adjustable gastric banding (AGB) surgery was sampled. Two hundred and eighty-four participants completed the GRWQ plus one novel question before the start of the education session. Inclusion and exclusion criteria and consecutive enrollment reduced potential for selection bias in this study. All data were self-reported creating the potential for recall bias on survey items, particularly height and weight data. This potential source of bias was not addressed in the paper.

The authors reported that for participants in this study to achieve their dream, happy, acceptable, and disappointed weight loss expectations they would have to lose 89 ± 8 %EWL, 77 ± 9 %EWL, 67 ± 10 %EWL, and 49 ± 14 %EWL respectively. In this sample, women reported more unrealistic happy and acceptable weights than men and placed more emphasis on the improvement of social and physical attributes after bariatric surgery. Younger participants were observed to have higher BMIs and anticipated that weight loss would most positively affect their social lives. In general, a greater BMI was associated with higher acceptable and disappointed weight loss expectations. Young women were observed to be the most vulnerable to unrealistic weight loss expectations before bariatric surgery. The authors noted that bariatric surgery candidates ranked

health, fitness, body image, work performance, and self-confidence as the most important perceived benefits of weight loss.

This study was limited by its cross-sectional design and potential for recall bias. The authors stated that patients were mailed an information booklet about bariatric surgery prior attending the education session where they were surveyed. This may have influenced the weight loss goals and expectations reported. The results of this study may not be generalizable outside the population of extremely obese treatment seeking adults in the USA healthcare system.

2.4.3.3 Heinberg et al. (2009). The aim of this study by Heinberg and colleagues (2009) was to examine the weight loss expectations of patients undergoing three different types of bariatric surgery through comparison to realistic expected outcomes for each surgery. The authors also sought to explore subgroup differences in realistic versus unrealistic weight loss expectation discrepancies. This was studied using a cross-sectional survey design.

One hundred and fourteen patients scheduled to undergo laparoscopic Roux-en-Y gastric bypass (LRYGB), laparoscopic adjustable gastric banding (LAGB), or LSG surgery were recruited to complete Part II of the GRWQ at their initial entry into the surgical program. Selection bias was minimized with inclusion criteria and consecutive enrollment. Sample size was not justified, but was large. Hospital staff measured height and weight data during an initial clinical visit, minimizing measurement bias. All other data collected via self-reported survey has the potential for recall bias.

The authors observed that average discrepancy between dream versus realistic weight after bariatric surgery was equivalent to losing 106% EWL. Happy, acceptable, and disappointed weight loss expectations versus realistic weight loss discrepancies (i.e., expected weight loss- realistic weight loss) corresponded to 20.14 ± 12.36 kg, 13.70 ± 11.32 kg, and -3.75 ± 20.70 kg respectively. As indicated, only patients' disappointed weight loss expectations fell within what could be considered a realistic outcome from their bariatric surgery. Gender differences in weight loss expectations were observed, with men having more realistic weight loss expectations than women. Caucasians, younger patients, and patients with higher BMIs were more likely to have unrealistic expectations in this sample. Analysis of variance revealed no significant differences in weight loss expectations between LRYGB, LAGB and LSG surgery types when controlling for baseline BMI. This study provides evidence that patients seeking different types of bariatric surgery have unrealistic expectations of postoperative weight loss and that women, Caucasians, younger patients, and patients with higher initial BMIs were more likely to have unrealistic weight loss expectations.

This study was limited by its cross-sectional design, potential for survey recall bias, and generalizability. The generalizability of study findings to populations outside of treatment seeking adults undergoing LRYGB, LAGB, or LSG in the USA healthcare system is questionable.

2.4.3.4 Karmali et al. (2010). The purpose of this study by Karmali and colleagues (2010) was to evaluate the impact of patients' comorbid conditions on their

motivation to proceed to bariatric surgery, and to determine their postoperative expectations of weight loss and comorbidity improvement.

Study surveys were administered cross-sectionally to 45 patients scheduled to undergo either LRYGB or LAGB at a Canadian hospital during the final preoperative clinic visit. By this time, patients in the program had already received preoperative education from the multi-disciplinary team via seminar, private consultation, and written materials. The majority of studies evaluating weight loss expectations have done so before formal surgical education, limiting the comparability of this work to the literature. The authors provided no explanation for the low sample size in this study, creating the potential for sampling bias. Inclusion and exclusion criteria were described. The survey included both parts of the GRWQ, with modified language to suit a bariatric surgery seeking population and the addition of three sections inquiring about comorbid conditions and expectations. The use of survey data opened the study to potential recall bias. The authors did not specify if height and weight data were self-reported or measured, which introduces potential recall bias for these variables.

The authors observed dream, happy, acceptable, and disappointed weights of 139 ± 70.1 lbs, 113.7 ± 64.4 lbs, 100.1 ± 62.6 lbs, and 79.6 ± 52.7 lbs respectively. Patients would be required to lose 98.7 %EWL, 84.5 %EWL, 73.5 %EWL, and 51.8 %EWL respectively to achieve their weight loss expectations. The authors described these weight loss expectations as unrealistic. Patients rated "a desire for change in medical conditions" as the most important influence on their goal weight choice, and dissatisfaction with obesity-related comorbidities was recognized as a primary motivator to undergo bariatric surgery. Subgroup analysis of study findings according to surgery

type resulted in the statistical comparison of groups with very small sample sizes (LRYGB n=22; LAGB n=23). Nonrandom assignment of study subjects and the small sample size of these subgroups open this analysis to potential bias and undermine the credibility of the subgroup analysis findings.

This study was mainly limited by its small sample size leading to potential sampling bias. The cross-sectional design, potential for survey recall bias of height and weight data, timing of survey administration after pre-surgical education, and questionable subgroup analysis also limited this study. This research was conducted in the Canadian healthcare environment. However the bariatric surgery program in Edmonton, Alberta is very different from others across the country, which may make these study findings less generalizable to other provinces.

This study provides evidence that LRYGB and LAGB surgery patients expect realistic improvements of their comorbid conditions after bariatric surgery but possess unrealistic postoperative weight loss expectations.

Table 2.4

Summary of weight loss expectation studies in bariatric surgery populations using the Goals and Relative Weights Questionnaire

Study Characteristic	White et al. (2007)	Kaly et al. (2008)	Heinberg et al. (2009)	Karmali et al. (2010)
Country of Origin	USA	USA	USA	Canada
Study Design and Sample	Prospective cohort; 139 GB surgery patients	Cross-sectional survey; 284 patients attending an educational session for GB or AGB surgery	Cross-sectional survey; 114 LRYGB, LAGB, and LSG patients	Cross-sectional survey; 45 LRYGB and LAGB patients
Purpose	Examine if weight goals change after substantial weight loss from bariatric surgery.	Examine weight loss expectations of candidates for bariatric surgery, and to determine factors effecting patient's perceptions of success.	Examine the weight loss expectations of patients undergoing three different types of bariatric surgery through comparison to realistic expected outcomes for each surgery.	Examine the impact a patient's comorbid conditions have on their motivation to proceed to bariatric surgery.
Potential Study Limitations	- generalizability - potential recall bias	- generalizability - potential recall bias, especially of height and weight data - no follow-up	- generalizability - potential recall bias - no follow-up	- potential sampling bias due to low sample size - potential recall bias, especially of height and weight data - limited comparability to other WLE literature - no follow-up
Statistical Analyses Appropriate	Yes.	Yes.	Yes.	Small sample sizes in subgroup analysis.

Weight Loss Expectations	Dream: 52.6 % Happy: 45.2 % Acceptable: 38.3 % Disappointed: 26.0 %	Dream: 89 ± 8 %EWL Happy: 77 ± 9 %EWL Acceptable: 67 ± 10 %EWL Disappointed: 49 ± 14 %EWL	Discrepancy between 'realistic' weight loss from surgery and weight loss expectation. Dream: 28.79 ± 13.21 kg Happy: 20.14 ± 12.36 kg Acceptable: 13.70 ± 11.32 kg Disappointed: -3.75 ± 20.70 kg	Dream: 98.7 %EWL Happy: 84.5 %EWL Acceptable: 73.5 %EWL Disappointed: 54.8 %EWL
Conclusion	GB surgery patients have unrealistic weight loss expectations, and unrealistic goals do not appear to negatively impact postoperative outcomes.	Bariatric surgery candidates have unrealistic weight loss expectations, and understand the benefits of surgical weight loss.	Patients seeking LRYGB, LAGB, and LSG surgery have unrealistic weight loss expectations. Women, Caucasians, younger patients, and patients with higher initial BMIs are most likely to have unrealistic weight loss expectations.	LRYGB, and LAGB surgery patients expect realistic improvements of their comorbid conditions after bariatric surgery but possess unrealistic postoperative weight loss expectations.

Note: GB= gastric bypass, %= percentage of total body weight, AGB= adjustable gastric banding, %EWL= percent excess weight loss, LRYGB= laparoscopic Roux-en-Y gastric bypass, LAGB= laparoscopic adjustable gastric banding, LSG= laparoscopic sleeve gastrectomy, WLE= weight loss expectations.

2.4.4 Weight loss expectations and treatment outcomes. The relationship between weight loss expectations and outcomes is currently unclear and is of increasing interest given the difference of findings in the literature surrounding this subject. Some research has suggested that high, unrealistic, weight loss expectations may negatively impact treatment outcomes (Byrne, 2002; Dalle Grave et al., 2005; Foster et al., 2001; Foster et al., 1997), while other literature has reported that high expectations have no impact on treatment outcome and may be motivational for patients (Ames et al., 2005; Jeffery, Wing, & Mayer, 1998; Libeton, Dixon, Laurie, & O'Brien, 2004; Linde, Jeffery, Finch, Ng, & Rothman, 2004; Linde, Jeffery, Levy, Pronk, & Boyle, 2005). In their systematic review, Crawford and Glover (2012) outlined two hypothesized relationships between weight loss expectations and outcomes based on behavioral theories and a possible link between them. These hypotheses stemmed from the observation of high weight loss expectations in overweight and obese populations seeking a variety of non-surgical and surgical weight loss interventions.

Several studies have proposed that unrealistic weight loss expectations may have a detrimental effect on treatment adherence, attrition, and weight loss outcomes (Dalle Grave et al., 2005; Foster et al., 2001; Foster et al., 1997; Wadden et al., 2003). This hypothesis follows the cognitive-behavioral approach proposed by Cooper and Fairburn in 2001. According to this model, striving to meet unrealistic expectations challenges weight loss by undermining motivation when goals are not reached. This process has also been suggested to negatively impact weight maintenance behaviors due to increased frustration with the weight loss process resulting in possible disengagement from those behaviors. In their study of obese women in a behavioral weight loss program, Byrne and

colleagues (2002) found that women who met their weight loss goals were more likely to sustain that weight loss then those who did not. This suggests that goal achievement is important to weight loss efforts. Programs have been developed to reduce weight loss expectations to improve weight loss outcomes. Foster and associates (1997) observed that while it was possible to reduce weight loss expectations, this had no effect on treatment outcomes in their population.

Conversely, it has been hypothesized that high weight loss expectations may act as an important motivator throughout the weight loss effort. The trans-theoretical construct of stages and processes of change suggests that in the contemplation stage, individuals consider the benefits and disadvantages of a behavior change before making the decision to pursue that behavior (Prochaska, DiClemente, & Norcross, 1992). Strong motivation to initiate weight loss and to perform weight loss behaviors may therefore be of critical importance to the weight loss effort. If expectations regarding weight loss were low, individuals may not experience engagement with the decision-making process to lose weight and so not initiate or maintain weight loss behaviors.

Researchers in the field of weight loss expectations have suggested an association linking these differing views. It follows a model of behavior change, which states that different beliefs govern initiation and maintenance of a behavior (Rothman, 2000). High outcome expectations may provide the motivation necessary to initiate weight loss behaviors, but satisfaction with outcome may be what's necessary to maintain these weight loss behaviors in the long term. Thinking style has also been implicated as a factor effecting weight regain. Byrne and colleagues (2002) also noted in their study that individuals who maintained weight loss had a more flexible thinking style, less

dichotomous, than those who regained it. This flexibility was suggested to allow weight maintainers to feel more satisfied with their weight outcomes even if they were lower than their pre-conceived notions and goals.

The reviewers concluded that there is a serious lack of strong evidence and consistency in the literature surrounding weight loss expectations and their association with treatment adherence, attrition, and weight loss outcomes (Crawford & Glover, 2012). Therefore, the relationship between weight loss expectations and outcomes remains unclear. More standardized, long-term studies are needed to determine the strength and direction of this relationship. The results could have huge implications for bariatric care and education.

2.5 Body Shape Expectations

2.5.1 Body image disturbance constructs. The idea of body shape expectations derives from the concept of body image disturbance and body image dissatisfaction. Body image refers to an individual's complex, multi-dimensional perception of his or her own physical appearance (Schilder, 1935). The term body image disturbance is used to describe an individual's misperception of body size, inaccurate assessment of body part size, concern about body attributes, and/ or inability to determine a realistic attainable size (Adami et al., 1999; Pingitore, Spring, & Garfield, 1997; Snyder, 1997; Valtolina, 1998). Body image disturbance is a major diagnostic component of eating disorders. Sorbara and Geliebter (2002) proposed that body image disturbance is composed of the three elements: distortion, discrepancy and dissatisfaction. This study focuses on the

element of body image dissatisfaction and its component expectations, and as such it will be the focus of this review.

Body image dissatisfaction is based on an individual's body shape expectations. It is defined in the literature as the discrepancy between an individual's perceptions of their current self-body shape and their ideal body shape (Schilder, 1935). These perceptions are also known as their body shape expectations, and can be conceptualized as their existing body image and the image of their desired body. The greater the discrepancy between perceived current and ideal body shape, the greater the degree of body image dissatisfaction experienced (Williamson, Gleaves, Watkins, & Schlundt, 1993). Body shape perception is a component of whole body image without focus on any specific body part or area and these terms are often used interchangeably in the literature. The direction of body image dissatisfaction, the desire to have either a smaller or larger body, can also be determined with body shape expectations.

The definition of body shape expectations was expanded for the purposes of this study. The literature has focused on the components of perceived current and ideal body shape (Adami et al., 1999; De Panfilis et al., 2007; Dixon et al., 2002; Hrabosky et al., 2006; Madan et al., 2008; Masheb et al., 2006; Munoz et al., 2010; Neven et al., 2002; Sarwer et al., 2008; Song et al., 2006; Teufel et al., 2012; van Hout et al., 2008). The body shape expectations of bariatric surgery candidates remain relatively unexplored, and to the best of this researcher's knowledge have only been investigated in the context of current and ideal body shape. The definition of body shape expectations was expanded in this study to include the body shapes that bariatric surgery candidates perceived in association with their dream, happy, acceptable, and disappointed weight loss

expectations. The evaluation of different levels of body shape expectation is a novel approach to the analysis of body image and body image disturbance in bariatric surgery candidates.

2.5.2 Evaluation of body shape. Stunkard and colleagues developed the first pictorial body shape evaluation tool, the Stunkard Figure Rating Scale (SFRS), in 1983. Briefly, this scale depicts nine silhouettes of increasing body size and is gender specific. The aim of this original study was to evaluate the genetics of obesity and thinness using the Danish Adoption Registry. Adoptees were mailed a questionnaire and asked to indicate the weight status of their adoptive parents and their own weight status using this new tool. The authors also conducted a validation study and concluded that the silhouette method of body size evaluation was accurate.

Since that time the SFRS has been psychometrically validated and used to study many aspects of figure selection in a variety of populations. Thompson (1991) psychometrically evaluated the SFRS and determined it to be reliable, valid, and an appropriate tool to investigate body image disturbance. They found that the SFRS has good two-week test-retest reliability ($r= 0.55\text{-}0.92$, $p< 0.001$) and moderate correlations with other measure of body image disturbance, eating disturbance, and overall self-esteem ($r= 0.16\text{-}0.60$, $p< 0.01$). A study by Williamson and associates (1993) validated the conceptualization of self-ideal body image discrepancy using the SFRS body image dissatisfaction (BID) score in a population of women with eating disorders. Koprowski and colleagues (2001) demonstrated that women could accurately recall past body size on the SFRS by correlation between actual BMI at the time of menarche and adult recall (r=

0.82, $p < 0.05$). Finally, Bulik and colleagues (2001) linked each of the nine female and nine male silhouettes on the SFRS with population based normative BMI data, associating each with a specific range of BMIs. When categorized in relation to BMI weight categories, the SFRS silhouettes were found to be representative of the range of BMIs from underweight in women (low end of normal weight in men) to obese Class II (both genders). Researchers have employed this visual scale to analyze ideal body size, current body size, body image dissatisfaction, and many other aspects of figure selection such as attractiveness to the opposite sex. The SFRS has been used to evaluate body size perception in patients with Type 2 Diabetes (Bays, Bazata, Fox, Grandy, & Gavin, 2009), perception of body size in parents and their children with Prader-Willi syndrome (Napolitano, Zarcone, Nielsen, Wang, & Caliendo, 2009), the relation of body size to lifetime risk of developing multiple sclerosis in women (Munger, Chitnis, & Ascherio, 2009), correlates of obesity and body image in Colombian women (Gilbert-Diamond, Baylin, Mora-Plazas, & Villamor, 2009), racial differences in body image and body satisfaction in overweight postpartum mothers (Carter-Edwards et al., 2010), the body image dissatisfaction of urban Ghanaian women (Benkeser, Biritwum, & Hill, 2012), sex differences in desired body shape (Fallon & Rozin, 1985), and body image dissatisfaction in obese outpatients seeking weight loss therapy (Sorbara & Geliebter, 2002) to name a few.

2.5.3 Body image disturbance in bariatric surgery populations. A thorough search of the literature revealed that the majority of studies examining body image disturbance and related factors in the bariatric surgery population have been performed

with survey instruments other than the SFRS. It has been suggested that employment of such a wide variety of non-standardized assessment tools and procedures of questionable reliability and validity has made it difficult to synthesize findings in this area (van Hout et al., 2008). A summary of body image disturbance studies in bariatric surgery populations using instruments other than the Stunkard Figure Rating Scale is presented in Table 2.5, and briefly in review below.

Several authors have observed impaired body image followed by normalization of body image disturbance after bariatric surgery using the Body Shape Questionnaire. Adami and colleagues (1999) were the first to apply it in their examination of the body image related impact of having body weight and shape far different than the expected standard. This study followed 20 patients undergoing biliopancreatic diversion surgery using the Body Shape Questionnaire, Body Attitude Questionnaire, and body dissatisfaction subscale of the Eating Disorder Inventory at baseline and 3 years post surgery. It found severely impaired body image before surgical weight loss and normalization of body image dissatisfaction, feeling of fatness, and physical attractiveness after weight loss. The authors noted that some aspects of body image alteration reflect inner feelings and could not be accounted for by weight status. Hrabosky and colleagues (2006) investigated appearance, presentation, and self-evaluation of appearance before and after weight loss in morbidly obese persons using the Body Shape Questionnaire, Shape and Weight Concern subscales, and the Eating Disorder Examination Questionnaire. GB surgery patients (n=109) completed these measures at baseline, 6 months, and 12 months after surgery. Significant, immediate reductions in body dissatisfaction and body concern were observed as well as

normalization of body image-related concerns even though the majority of patients remained overweight or obese. Masheb and colleagues (2006) performed an examination of the difference between overevaluation and body image dissatisfaction in 2006. This study surveyed 145 GB patients prior to and 6 months after surgery using the Body Shape Questionnaire, Rosenberg Esteem Scale, Beck Depression Inventory, and Eating Disorder Examination Questionnaire. The study findings indicate that evaluating oneself by shape and weight is related to, but distinct from, being dissatisfied about shape and weight. They also observed that both overevaluation and body image dissatisfaction improved substantially following surgical weight loss.

Studies using a variety of other survey tools have also been used to measure body image disturbance related outcomes in bariatric surgery populations. Dixon and colleagues (2002) used a cross-sectional design to examine appearance, presentation, and self-evaluation of appearance before and after weight loss in 322 morbidly obese persons undergoing LAGB. These researchers employed the Multi-Dimensional Body Self Relations Questionnaire, Beck Depression Inventory, and SF-36 health survey prior to and periodically until 4 years after surgery. They found major improvement of appearance evaluation after weight loss surgery, which was associated with psychological benefit.

De Panfilis and colleagues (2007) found similar psychological benefit in their prospective survey of 35 LAGB surgery patients in Italy. This team of researchers used the Body Uneasiness Test, Eating Disorder Inventory II, and a Structured Clinical Interview for DSM-IV Axis-I Disorders tool to examine if body image disturbance improves one year after LAGB surgery. They concluded that this bariatric surgery may

improve some aspects of body image disturbance and that improved eating behaviors may contribute to this effect.

A cross-sectional evaluation by Madan and colleagues (2008) compared 8 preoperative and 19 postoperative laparoscopic GB patients using a subscale of the Body-Esteem Scale for Adolescents and Adults to examine the effect of this surgery on body esteem. They observed that overall body-esteem improves after bariatric surgery.

Sarwer and colleagues (2008) investigated quality of life, self-reported stigmatization, and depressive symptoms in bariatric surgery patients using a cross-sectional survey design. Bariatric surgery patients (n=117) completed the Weight and Lifestyle Inventory, Stigma Situations Questionnaire, Impact of Weight on Quality of Life- Lite, and Beck Depression Inventory II at a psychosocial/behavioral evaluation of appropriateness for surgery. This study concluded that individuals reported infrequent weight stigmatization and weight stigmatization was unrelated to BMI. They also found that existing stigmatization related to body size and that stigmatization was associated with poorer weight-related quality of life and more depressive symptoms in those that were affected.

A prospective survey study by van Hout and associates (2008) in the Netherlands surveyed 104 laparoscopic vertical banded gastroplasty patients to explore changes in patients' psychosocial functioning, personality, and body image in the first two years after bariatric surgery. These outcomes were assessed with the Body Attitude Test, Dutch Personality Questionnaire, and Symptom Checklist-90. Bariatric surgery was found to lead to significant improvement in psychosocial functioning and body image in this

population. However, initial improvements in depressive symptoms, self-esteem, sleeping problems, and neuroticism were observed to wane over time.

Finally, Teufel and colleagues (2012) examined body image in a sample of 62 LSG surgery patients at baseline, 1, 3, 6, and 12 months postoperatively. The Body Image Questionnaire and Patient Health Quesitonnaire-9 were used. This study found that body image improves after LSG and may reflect changes in patients' attitudes, beliefs, and thoughts rather than weight loss.

In summary, there is a consistency in the findings of improved body image disturbance after bariatric surgery despite differences in assessment of surgical populations, aspects of body image disturbance measured, survey instruments used, and study design in the existing literature.

Table 2.5

Summary of body image disturbance studies in bariatric surgery populations using instruments other than the Stunkard Figure Rating Scale

Study	Design & Sample	Purpose	Survey Instruments	Conclusion
Adami et al. (1999)	Prospective survey; 20 BPD surgery patients	Examine the body image related impact of having body weight and shape far different than the expected standard.	- Body Shape Questionnaire - Body Attitude Questionnaire - Eating Disorder Inventory, body dissatisfaction subscale	Body image is impaired before surgical weight loss. Body image dissatisfaction and feeling of fatness and physical attractiveness normalize after weight loss.
Dixon et al. (2002)	Cross-sectional survey; 322 LAGB surgery patients	Examine appearance, presentation and self-evaluation of appearance before and after weight loss in morbidly obese persons.	- Multi-Dimensional Body Self Relations Questionnaire - Beck Depression Inventory - SF-36 health survey	Appearance evaluation improves after surgical weight loss and is associated with psychological benefit.
Hrabosky et al. (2006)	Prospective survey; 109 GB surgery patients	Examine changes in body image and body dissatisfaction post bariatric surgery.	- Body Shape Questionnaire - Shape and Weight Concern, subscales - Eating Disorder Examination Questionnaire	Body image-related concerns and body image dissatisfaction normalize after bariatric surgery.

Masheb et al. (2006)	Prospective survey; 145 GB surgery patients	Examine the difference between overevaluation and body image dissatisfaction.	- Body Shape Questionnaire - Rosenberg Esteem Scale - Beck Depression Inventory - Eating Disorder Examination	Evaluating oneself by shape and weight is distinct from being dissatisfied with shape and weight. Overvaluation and body image dissatisfaction improve with weight loss.
De Panfilis et al. (2007)	Prospective survey; 35 LAGB surgery patients	Examine if body image disturbance improves one year after LAGB surgery.	- Body Uneasiness Test - Eating Disorder Inventory II - Structured Clinical Interview for DSM-IV Axis-I Disorders	Bariatric surgery may improve some aspects of body image disturbance. Improved eating behavior may contribute to this effect.
Madan et al. (2008)	Cross-sectional survey; 27 laparoscopic GB surgery patients	Examine the effect of laparoscopic GB on body esteem.	- Body-Esteem Scale for Adolescents and Adults, subscale	Overall body-esteem improves after bariatric surgery.
Sarwer et al. (2008)	Cross-sectional survey; 117 bariatric surgery patients	Examine quality of life, self-reported stigmatization and depressive symptoms in bariatric surgery patients.	- Weight and Lifestyle Inventory - Stigma Situations Questionnaire - Impact of Weight on Quality of Life- Lite	Weight stigmatization is infrequent, unrelated to BMI, and associated with poorer weight-related quality of life and more depressive symptoms.

			- Beck Depression Inventory II	
van Hout et al. (2008)	Prospective survey; 104 LVGB surgery patients	Examine changes in patients' psychosocial functioning, personality, and body image in the first two years after bariatric surgery.	- Body Attitude Test - Dutch Personality Questionnaire - Symptom Checklist-90	Bariatric surgery leads to significant improvement in psychosocial functioning and body image, however initial improvements in depressive symptoms, self-esteem, and neuroticism wane over time.
Teufel et al. (2012)	Prospective survey; 62 LSG surgery patients	Examine body image after LSG.	- Body Image Questionnaire - Patient Health Quesitonnaire-9	Body image improves after LSG and may reflect changes in patients' attitudes, beliefs, and thoughts rather than weight loss.

Note: BPD= biliopancreatic diversion, LAGB= laparoscopic adjustable gastric banding, GB= gastric bypass, LVGB= laparoscopic vertical banded gastroplasty, LSG= laparoscopic sleeve gastrectomy.

2.5.4 Body image disturbance and the figure rating scale. The SFRS has been used to study the body image disturbance of morbidly obese adults seeking bariatric surgery. To the best of my knowledge, only three studies have used the SFRS to assess body image and body image dissatisfaction in bariatric surgery patients (Munoz et al., 2010; Neven et al., 2002; Song et al., 2006). The studies are summarized in Table 2.6, and are critically appraised below.

2.5.4.1 Neven et al. (2002). The aim of this study by Neven and associates (2002) was to examine the effects of RYGB surgery on body image to increase understanding of psychosocial benefits associated with the surgery. This was investigated using a cross-sectional survey design. The authors compared the survey responses of four different groups of RYGB patients at baseline (n=20), 1-3 weeks after surgery (n=14), 6 months post surgery (n=24), and 1 year post surgery (n=20). No attempts were made to match baseline characteristics of the patients in the four RYGB groups. It is unclear how subjects were recruited for this study and why there were an uneven number of subjects in the four patient groups. Patient inclusion and exclusion criteria were not specified, and no sample size calculation was presented or justified. The authors note that the RYGB patient groups appear similar with respect to baseline age and BMI as well as education, race, and gender. No statistical analyses were performed to compare the similarity of the patient groups. Age and gender may have important impacts on obesity, health, and treatment seeking behavior perhaps biasing the comparison of the four patient groups (Deeks, Lombard, Michelmore, & Teede, 2009).

Subjects were surveyed at one time point with the Multi-Dimensional Body-Self Relations Questionnaire- Appearance Evaluation subscale and the SFRS. The tool-specific scores obtained were not reported. This makes it very difficult to compare the findings of this study to any using the same outcome measurement tools, reducing its generalizability. It is unclear why the authors chose to use multiple t-tests to compare the difference between the survey responses of the four groups of RYGB patients after ANOVA instead of performing a post-hoc analysis. This unnecessary multiple comparison introduced the possibility of Type I error, or obtaining a false positive.

This study found that there was a significant difference between RYGB patients' perceptions of current body image between pre-surgery and 6 months post surgery, and between 6 months and 1-year post surgery. There was no significant difference in current body image perception 1-3 weeks after surgery. Perceived ideal body image was not significantly different between the groups at any time point. The difference between current and ideal body image was also observed to be significantly different pre-surgery and 6 months post surgery, and between 6 months and 1 year post surgery. The authors concluded that RYGB surgery resulted in dramatic improvement in perceived body image over time.

Limitations of this study included the small sample size with lack of sample size justification, and a lack of inclusion and exclusion criteria or means of patient selection indicating potential selection bias. Another serious limitation was the lack of matching or controlling for baseline and demographic characteristics between the four time point RYGB patient groups, since their comparison was designed to shed light on changes in

self-perceived body image following bariatric surgery. There was no statistical comparison of the RYGB patient groups to determine if they were significantly different or not. Survey instrument specific scores were not reported, only the results of statistical analyses, opening this study to measurement bias and limiting its generalizability and comparability with other studies in the field.

2.5.4.2 Song et al. (2006). This research aimed to investigate body perception and ideals, condition-specific and general quality of life, and mood stability in body-contouring patients after massive weight loss from bariatric surgery. This was done with a prospective survey design. Study subjects were recruited over a 9-month period in a USA university healthcare clinic. Eligible participants had had bariatric surgery >12 months before screening for body-contouring, and were eligible for and received body contouring surgery within the study timeframe. Overall, the inclusion and exclusion criteria were clearly defined.

Forty individuals consented to participate in this study, however only the 18 patients who received body-contouring surgery within the study timeframe were included in analysis. The authors accounted for the 22 lost patients (surgery cancellation; change of surgery dates outside of study window). The low sample size was not discussed or justified.

Patients were surveyed at baseline, 3-months post surgery, and 6-months post surgery. There was a loss to follow-up of 5 patients (28%) at 6-months, which was not explained by the authors. This may have biased study findings. Four novel or modified

surveys and one established survey were used to assess the body perception and ideals, body image satisfaction, areas of distress, mood, and quality of life of the body-contouring patients at these time points. The surveys used included the modified Pictorial Body Image Assessment (PBIA), novel Body image and Satisfaction Assessment, novel Current Body Image Assessment, modified Beck Depression Inventory, and the Health-Related Quality of Life Questionnaire. The psychometric qualities of these novel and modified tools were questionable. No attempt was made to discuss or test their psychometric properties in this study.

Body perception was evaluated using the PBIA, a modified and renamed version of the SFRS. Changes in the PBIA from the original SFRS included; reduction of the number of silhouetted from 9 to 7, re-drawing of the silhouettes to represent a wider range of body weights, and evaluation of figure selection on a 13-point scale (1= underweight to 13= severely obese). These dramatic and unique modifications of the SFRS into the PBIA made the results of this study very difficult to compare to other literature in this field of body image disturbance. This limited generalizability of study findings. While the psychometric qualities of the SFRS had been previously established, the validity and reliability of this intensively modified version of the scale was unknown and not addressed by the authors. This reduced the credibility of the study findings on body image, and opened the study to potential measurement bias.

Song and colleagues (2006) found that patients perceived their current body shape to be significantly slimmer ($p<0.05$) at 3-months and 6-months after body contouring surgery than at baseline. Also, patients had a stable recollection of their body shape before bariatric surgery and body contouring. Finally, patients' ideal body shape was

observed to decrease significantly at 3-months after body contouring surgery, and then stabilize with no significant difference from baseline at 6-months. The authors concluded that body contouring after bariatric surgery improves body image and quality of life. They also noted improvements in body satisfaction, and a reduction in perceived ideal body shapes within 3-months of surgery that reflect thinner ideals.

This study was limited by the small sample size, potential measurement bias of outcome data via questionable psychometric qualities of modified and novel survey tools, and limited generalizability of body image related findings due to modification of the SFRS and research performed in the USA healthcare system. The researchers controlled for potential selection bias with explicit inclusion and exclusion criteria. Loss to follow-up was high, 28%, and unexplained, creating a source of bias.

This study provides evidence that self body image and body satisfaction improve after body contouring surgery in bariatric surgery patients.

2.5.4.3 Munoz et al. (2010). The purpose of this study by Munoz and colleagues (2010) was to examine changes in perceived current body shape, ideal body shape, and the discrepancy between the two in bariatric surgery patients over 1 year post-surgery. This was undertaken with a prospective survey study design. The researchers recruited 57 patients seeking RYGB surgery at a large Midwestern USA health center. Patient selection criteria were not described, so it is unclear how study subjects were chosen, opening the study to potential selection bias. Consecutive enrollment can be assumed but is not verified in the text.

Subjects completed the SFRS as a part of a larger psychological assessment protocol prior to surgery and 1-year after surgery. The SFRS was administered as recommended and the current, ideal, and discrepancy scores were reported allowing for comparisons with other studies. The authors reported no loss to follow-up.

The results of this study showed that at baseline participants perceived their mean current body shape at figure 8.12 ± 1.19, and ideal body shape at figure 4.13 ± 0.74 with a discrepancy score of 4.16 ± 1.75 figures. One year after RYGB, participants perceived current body image at figure 5.78 ± 1.69, ideal body image at figure 3.39 ± 1.63, and a resultant discrepancy score of 2.39 ± 1.99 figures. There was a statistically significant decrease in current body shape, ideal body shape, and discrepancy values compared to baseline. The authors observed that there was a significant reduction in perceived current body shape one year after RYGB ($p<0.00$), participants selected significantly smaller ideal body shapes after weight loss ($p=0.02$), and there was a significant decrease in the discrepancy between current and ideal body shapes (body image dissatisfaction) over time after surgery ($p<0.01$).

Munoz and colleagues (2010) concluded that (1) over the course of 1-year bariatric surgery patients report a significant difference in their perception of body shape and also in their concept of ideal body shape, and (2) the reduction in discrepancy between these two factors indicates increased body satisfaction after bariatric surgery. They reported that these findings suggest a consequence of rapid weight loss may be a move towards idealizing more unrealistic body shapes, and advise patient counseling for body image post surgery.

This study was limited mainly by the lack of explicit subject selection criteria leaving it vulnerable to selection bias. The generalizability of study findings to other populations, like that in NL, was limited by the small sample size, specific surgery examined, and investigation in the context of the USA healthcare environment.

The findings suggest that body image improves after bariatric surgery and that following weight loss patients may idealize thinner silhouettes than before surgery.

Table 2.6

Summary of body image disturbance studies in bariatric surgery populations using the Stunkard Figure Rating Scale

Study Characteristic	Neven et al. (2002)	Song et al. (2006)	Munoz et al. (2010)
Country of Origin	USA	USA	USA
Study Design and Sample	Cross-sectional pilot study; 78 RYGB surgery patients in four comparative groups	Prospective survey; 18 body contouring patients who had undergone bariatric surgery	Prospective survey; 57 RYGB surgery patients
Purpose	Examine the effects of RYGB surgery on body image.	Examine body perception and ideals, condition-specific and general quality of life, and mood stability in body contouring patients post massive weight loss.	Examine changes in perceived current body shape, ideal body shape, and the discrepancy between the two in bariatric surgery patients over 1 year post-surgery.
Potential Study Limitations	- low sample size - potential selection bias - potential demographic differences between groups - generalizability	- low sample size - potential measurement bias - high loss to follow-up - generalizability	- low sample size - potential selection bias - generalizability
Statistical Analyses Appropriate	Questionable use of t-tests to find significance between groups after ANOVA instead of post-hoc analysis.	Yes.	Yes.

Body Shape Expectations	Specific scores were not provided, only the results of statistical analyses.	Modification of the SFRS in this study made its findings incomparable to those in the present study (ie. Evaluated on a 13-point scale with 5 figures, instead of a 9-point scale with 9 figures).	Baseline: Current = 8.12±1.19 Ideal = 4.13±.74 Discrepancy score= 4.16±1.75 One year post-surgery: Current= 5.78± 1.69 Ideal= 3.39± 1.63, Discrepancy score= 2.39± 1.99
Conclusion	Body image improves after RYGB surgery.	Body image and body image satisfaction improve after body-contouring following surgical weight loss.	Current body image improves after bariatric surgery and patients may idealize thinner silhouettes than before surgery.

Note: USA= United States of America, RYGB= Roux-en-Y gastric bypass, ANOVA= Analysis of variance, SFRS= Stunkard Figure Rating Scale.

2.6 Summary of Gaps in the Clinical Literature

In summary, a review of the clinical literature revealed that several gaps exist in relation to the weight loss and body shape expectations of bariatric surgery patients. Firstly, very few studies have examined the weight loss expectations of bariatric surgery patients using the GRWQ, a gap which is particularly apparent in relation to LSG surgery and from the Canadian healthcare perspective. Secondly, the body shape expectations of bariatric surgery candidates remain relatively unexplored. Limited investigation in this area has focused on body shape expectations in the context of current and ideal body shape and has not used the SFRS. Finally, little is known about candidates for bariatric surgery in NL, and there is no literature currently available investigating the weight loss and body shape expectations of this population. These gaps in the literature provided the basis of the present investigation and guided the development of the research questions.

Chapter 3: Methods

A quantitative cross-sectional survey design was used to examine the postoperative weight loss and body shape expectations of LSG candidates in NL. The study design also allowed for the evaluation of demographic characteristics, the impact of current weight on life, critical points of weight gain in candidates' lives, factors influencing goal weight choice, weight loss achievement beliefs, and body image dissatisfaction. This chapter provides an overview of the study population and sample, procedure, instruments, data analysis, and ethical considerations used in this study.

3.1 Population and Sample

This cross-sectional study targeted all individuals in the province of NL eligible for bariatric surgery according to the 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children (Lau et al., 2007). The sample population was restricted to individuals who met the following inclusion criteria: (a) were referred to the Bariatric Surgery Clinic at Eastern Health, NL for LSG intervention, (b) had their referral screened by the Bariatric Nurse Practitioner and were determined to be eligible for LSG according to clinical practice guidelines, (c) were invited to attend mandatory pre-surgical Bariatric Surgery General Orientation at Eastern Health, (d) attended a Bariatric Surgery General Orientation session on October 17th 2011, January 6th 2012, or March 1st 2012, (e) were mentally competent and able to give full and informed consent to complete the questionnaire, (f) were nineteen years of age or older, and (g) were capable of completing the questionnaire in the English language.

The total size of the accessible population was 84 bariatric surgery candidates over the course of three Bariatric Surgery General Orientation sessions. Every candidate consented to participate, resulting in a 100% response rate. The sample size was large enough to power descriptive statistics (Munro, 2001).

3.2 Procedure

Data collection commenced following confirmation of ethical approval from the Human Research Ethics Authority of Newfoundland and Labrador (Appendix A). Data were collected between October 17th, 2011 and March 1st, 2012 over the course of three consecutive Bariatric Surgery General Orientation sessions. The multi-disciplinary Bariatric Surgery Clinic team hosted these sessions at the Health Sciences Centre in St. John's, NL.

The purpose of Bariatric Surgery General Orientation was to provide pre-surgical education to potential bariatric surgery candidates in the province of NL. Education was provided concerning risks and outcomes associated with LSG, the dietary and lifestyle changes required before and after LSG, and patient flow within the multi-disciplinary clinic environment. The information was presented to candidates via a three-hour visual presentation accompanied by printed handouts. Educational material was prepared and presented by the multi-disciplinary clinical team. Bariatric surgery candidates had not received any educational information from Eastern Health about the bariatric surgery program prior to their orientation session. Attendance at a Bariatric Surgery General Orientation was a required component (Figure 3.1).

The study questionnaire was introduced, administered, and collected by a research team member (HP) before the start of the each Bariatric Surgery General Orientation. Questionnaires were distributed face down in front of each candidate. The nurse practitioner then introduced the researcher team member (HP), who introduced herself, the research team, and the research initiative. Participants were given an average of twenty-five minutes to complete the questionnaire while the multi-disciplinary clinical team prepared to start their presentations. Printed educational materials to accompany the presentation were made available during this time as an alternative activity if a candidate declined to participate in the study. Latecomers were directed to an available seat and given the same introductory address by the research team member (HP). At the end of the allotted time period, the research team member (HP) collected the questionnaires face down in a box. The completed questionnaires were kept locked in a file cabinet in the Patient Research Centre.

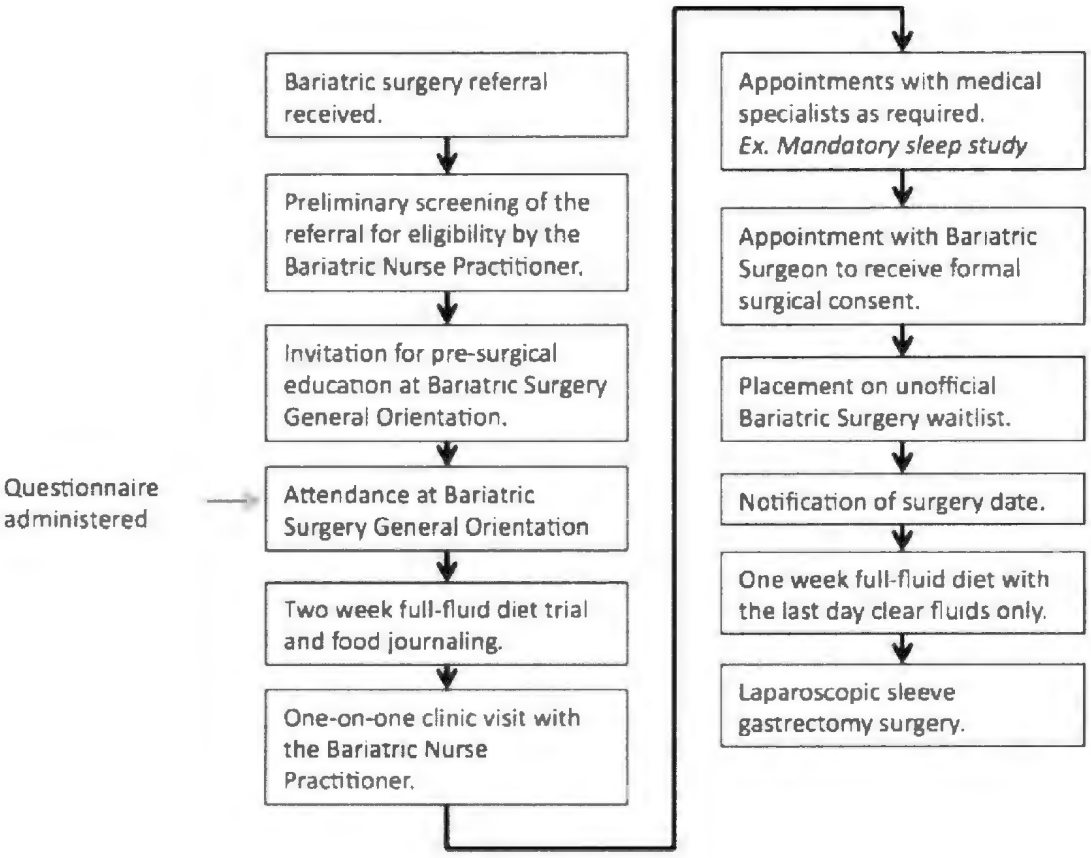


Figure 3.1 **Diagram of patient flow through Bariatric Surgery Clinic at Eastern Health.**

3.3 Instruments

Data were collected with three survey instruments: a demographic information form, a modified version of the GRWQ, and a modified version of the SFRS. Responses to all items were anonymous and self-reported. This included the anonymous self-report of height, current weight, and comorbidity data. In this study it was not feasible to directly measure height and current weight due to (a) the public location of the Bariatric Surgery General Orientation sessions and (b) inaccessibility to bariatric scales. The anonymity associated with questionnaire administration prohibited linkage of the surveys to the patient's medical record prior to surgery therefore chart abstraction to confirm reliability and validity of self-reported height, weight, and co-morbid conditions was not an option for this convenience sample.

3.3.1 Demographic information. The demographic information form was developed to collect basic demographic information and obesity-related medical history from study participants (Appendix B). Variables included age, gender, height, marital status, education level, employment status, and the presence of physician diagnosed Type 2 Diabetes, Type 1 Diabetes, gestational diabetes, hypertension, osteoarthritis, sleep apnea, cardiovascular disease, high cholesterol, asthma, depression, urinary incontinence, reflux, or infertility. Respondents were presented with a list of obesity-related comorbidities and asked if they had "ever been diagnosed by a doctor with any of the following conditions?". In this way a profile of the physician diagnosed medical conditions in the sample population was captured through self-report.

3.3.2 Goals and Relative Weights Questionnaire. The weight loss goals and expectations of bariatric surgery candidates were assessed using the GRWQ. This survey tool was developed and validated by Foster and colleagues in 1997 to further the understanding of patient's goals, expectations, and evaluations of behavioral weight loss therapy. Part I of the GRWQ asks participants to report their goal weight and current weight in pounds and to describe the impact of these weights on 20 select factors. Part II of the questionnaire asks participants to numerically define their weight loss expectations in the four categories of dream, happy, acceptable, and disappointed weight (Table 2.2). The GRWQ is reported to have one-week test-retest reliability coefficients for the four weight loss categories of $r > 0.96$ ($p<0.001$) for all, and $r = 0.60\text{-}0.82$ ($p<0.001$) for the 20 factors effected by weight loss (Foster et al., 1997). Since its development the GRWQ has been used to assess overweight and obese populations seeking both operative and non-operative weight loss interventions (Anderson et al., 2003; Heinberg et al., 2009; Masheb & Grilo, 2002; Silva et al., 2008; Teixeira et al., 2004; White et al., 2007). Permission to administer the GRWQ and a complete copy of the tool were obtained from Dr. Foster via personal communication on September 9th, 2011.

The GRWQ was modified to suit the study population according to similar studies in the clinical literature. As previously stated, this questionnaire was designed for use in a population seeking non-operative behavioral weight loss therapy. As such, simple alteration of the wording of prompts, questions, and phrases was necessary to put the survey items in context for bariatric surgery candidates. Karmali and colleagues (2010) modified the wording of the GRWQ to assess the weight loss goals of bariatric surgery patients in Alberta, Canada. A copy of this modified version of the GRWQ was obtained

through personal communication with Dr. Karmali on October 11th, 2011. This was used as a template to guide all changes to the GRWQ in the present study to minimize bias and increase comparability between the studies. A complete version of the modified questionnaire is presented in Appendix B.

Five novel questions were added to the GRWQ based on findings in the qualitative arm of the Newfoundland and Labrador Bariatric Surgery Cohort (NL BaSCo) study. These included two questions repeated after each weight loss category question in Part II, and three questions appended as a Part III section (Appendix B). In Part II candidates were asked in each weight loss expectations category (i.e. dream, happy, acceptable, and disappointed) if they believed weight loss surgery would allow them to achieve this weight, and in what time frame they expected the weight loss to occur. In Part III candidates were asked to identify critical points of weight gain in their lives, their bariatric surgery knowledge level, and their sources of bariatric surgery information.

3.3.3 Stunkard Figure Rating Scale. The SFRS is a series of nine gendered silhouettes of progressively larger body size used to quantitatively assess body shape expectation and the degree and direction of body image dissatisfaction. Illustrated by Stunkard and colleagues in 1983 for evaluation of eating disorders, it has since been psychometrically validated and extensively used to evaluate body image in overweight and obese populations (Fallon & Rozin, 1985; Masheb et al., 2006; Munoz et al., 2010; Sorbara & Geliebter, 2002). The SFRS was found to have good two-week test-retest reliability ($r= 0.55\text{-}0.92$, $p< 0.001$) and moderate correlations with other measure of body

image disturbance, eating disturbance, and overall self-esteem ($r= 0.16\text{-}0.60$, $p< 0.01$) (Thompson, 1991).

The SFRS was integrated with the GRWQ in this research study. A copy of the silhouettes was presented to participants in Part I of the questionnaire when asked about their current and ideal weights, and after each weight loss category in Part II for a total of six figural responses. Participants were asked to indicate the figure they perceived to represent their current weight body shape and their goal/ideal weight body shape. They were also asked to define their body shape expectations in four categories "dream", "happy", "acceptable" and "disappointed" by indicating the figure they associated with each of these categories.

The SFRS was evaluated on a continuous 1-9 scale with 1 representing the leanest figure and 9 representing the largest figure on both the male and female scales. Intermediate figure values were possible. For example, a score of 5.5 indicated a desired body shape between the body shapes of figure 5 and figure 6. Body image dissatisfaction was scored (Williamson et al., 1993). The mean body shapes desired in each weight loss category were linked to population based normative BMI data according to Bulik and colleagues (2001). In this way each body shape expectation was assigned a specific BMI value for further analysis.

3.4 Data analysis

Data were coded and entered into Statistical Package for the Social Sciences (SPSS) version 19.0 (IBM Corp., Armonk, NY) for analysis. The database computer was password protected. Each questionnaire was assigned a unique respondent ID. Unclear

or incomplete survey items were flagged during data entry. These were brought to the attention of the research team where each item was discussed and a decision concerning its eligibility and entry was made. Since the number of respondents and variables were small, all data were checked using descriptive statistics for continuous variables or using frequencies for categorical variables. No errors were found and no major outliers were detected.

Descriptive statistics were used to examine demographic variables, weight loss goals and expectations, Likert scale scores, and body shape ratings. The equations and conversion factors used to compute all calculated variables (height and weight into metric units, BMI, ideal body weight, percentage of excess weight loss, absolute weight loss, total weight loss, change in BMI, percentage of excess BMI loss, and body image dissatisfaction score) are shown in Table 3.1.

Ideal body weight was calculated as the mean of the 'medium frame' ideal body weights for women and men from the 1983 Metropolitan Height and Weight Tables ("1983 metropolitan height and weight tables," 1983).

Percent excess body weight loss was calculated according to the equation: %EWL= (current weight–weight loss expectation category weight) ÷ (current weight–ideal body weight) x 100 (Montero et al., 2010).

A body image dissatisfaction (BID) score was calculated as the difference between participants' mean current body shape and mean goal/ideal body shape using the equation: BID= current shape- ideal shape (Williamson et al., 1993).

One-way ANOVA was used to evaluate the significance of association between weight loss expectations category variables. The Bonferroni multiple comparison

procedure was used to determine specific differences between group means for ANOVA. All statistical tests were performed with 95% confidence interval and an alpha significance level of 0.05. A one-sample Kolmogorov-Smirnov test was conducted to calculate the Kolmogorov-Smirnov Z values of 'goal weight choice' variable Likert scale ratings. Briefly, the one-sample Kolmogorov-Smirnov test is a nonparametric test that compares the cumulative one-dimensional distribution function for a variable with a specified theoretical distribution, in this case the normal distribution (Munro, 2001). This test computes the Kolmogorov-Smirnov *Z* from the largest absolute difference between the observed and theoretical cumulative distribution functions, giving an indication of how strongly a variable deviates from other variables in the distribution. In this case, a 'goal weight choice' variable with an extreme Z value would indicate strong response to that variable from survey respondents compared to their responses to other 'goal weight choice' variables. A Z cutoff value of 2.0 was used to establish significance in this study as in the study of weight loss expectations performed by Karmali and colleagues (2010). This indicates that the mean value of the goal weight choice variable of interest is 2.0 standard deviations higher than the mean for the entire population of goal weight choice variables (Karmali et al., 2010).

Table 3.1
Operational definitions of study variables

Variable	Equation	Final Units
Height	height (m)= height (inches) x 0.0254	m
Weight	weight (kg)= weight (lbs) x 0.4536	kg
Body Mass Index	BMI= weight (kg) ÷ height $(m)^2$	kg/m^2
Ideal body weight	IBW= Σ (weight 'medium' frame size) ÷ n	kg
Percentage excess weight loss	%EWL= (current weight–weight loss expectation category weight) ÷ (current weight– IBW) x 100	%
Absolute weight loss	AWL= (current weight – weight loss expectation category weight)	kg
Percentage of total weight loss	%TWL= [1– (weight loss expectation category weight ÷ current weight)] x 100	%
Change in BMI	ΔBMI= (current BMI– weight loss expectation category BMI)	kg/m^2
Percentage excess BMI loss	%EBMIL= [(BMI– weight loss expectation category BMI) ÷ (BMI–24.99)] x 100	kg/m^2
Body image dissatisfaction score	BID= mean current shape- mean ideal shape	SFRS silhouettes

3.5 Ethical Considerations

Ethical considerations were addressed in the planning and implementation of this research project. The Health Research Ethics Board, Memorial University of Newfoundland, a subcommittee of the Health Research Ethics Authority of Newfoundland and Labrador, approved this research before data collection began (Appendix A).

Ethical considerations were made during the recruitment and data collection phases of this study. The bariatric nurse practitioner acted as an intermediary to introduce the research team and the research initiative at each educational session. After their introduction, the research team member (HP) clearly explained to potential participants: (a) that participation in the study was voluntary, and would provide no immediate benefit to participants or impact the quality of their care, (b) that completion of all or part of the questionnaire constituted informed consent on the part of the participant, (c) that participant responses would remain anonymous and confidential, (d) that the research had been approved by ethics authorities, (d) that participants should not include any potentially identifying information on the questionnaire, and (e) that questions were welcomed and should be directed to the research team member (HP) and or her supervisor. Printed handouts to accompany the upcoming presentation were made available as an alternate activity during the questionnaire completion period if a candidate declined to participate in the study.

All questionnaires were anonymous and confidential, and this state was maintained throughout the research study. Storing the completed questionnaires in a locked filing cabinet in the Patient Research Centre at Eastern Health accessible only to

the co-investigators and one research team member (HP) ensured confidentiality of patient information. Electronic versions of the data and database were password protected.

Chapter 4: Results

The following chapter presents the study findings in three sections. The first section presents a demographic profile of the sample population including weight measures, comorbidity profile, and socio-demographic characteristics. The second section presents findings of the weight loss goals and expectations of bariatric surgery candidates. Subsections describe the impact of current weight on candidates' lives, critical points of weight gain, goal weight choice factors, specific weight loss expectations, and time to weight loss and achievement beliefs. The final section presents body shape expectation findings including bariatric surgery candidates' expectations of body shape and body image dissatisfaction.

4.1 Demographic and Obesity-related Comorbidity Profile

The socio-demographic characteristics gender, age, BMI, education level, and marital status were described for the sample population (Table 4.1). The study sample of bariatric surgery candidates included 69 women (82%) and 15 men (18%). Every candidate consented to participate, resulting in a 100% response rate. The mean ± standard deviation (SD) age of the sample was 43.6 ± 8.7 years with a mean BMI of 49.0 ± 7.0 kg/m^2. The range of BMI values was 29.1 kg/m^2. The majority of the surgical candidates (57.1%) had completed a post-secondary education. Almost half (48.2%) of candidates were employed fulltime, while 19.3% of individuals seeking bariatric surgery were on short or long term disability leave. The majority of bariatric surgery candidates (71.4%) were married or in a common law relationship.

The sample population was heavily burdened with obesity-related comorbidities. Respondents were presented with a list of obesity-related comorbidities and asked if they had "ever been diagnosed by a doctor with any of the following conditions?". In response to this question the mean number of self-reported comorbid conditions was 2.8 ± 2.0 medical conditions. The median number of chronic condition was 2.0 with a range of 9.0. The most common self-reported obesity-related comorbidities were hypertension (42.9%), high cholesterol (35.7%), depression (33.3%), and Type 2 Diabetes (29.8%). The least commonly reported comorbidities were Type 1 diabetes or gestational diabetes (4.8%), infertility (6.0%), and cardiovascular disease (8.3%).

Table 4.1

Demographic information and comorbidity profile of LSG candidates in NL

Characteristic	Mean ± SD	
Age, years	43.7 ± 8.7	
BMI, kg/m^2	49.0 ± 7.0	
Number of chronic conditions	2.8 ± 2.0 (median 2.0)	
	n	**%**
Female	69	82.1
Married	60	71.4
Employment status		
Employed full-time	40	48.2
Disability leave (short & long term)	16	19.3
Unemployed	8	9.6
Other employment (part-time, casual, home-maker, retired, other)	19	22.8
Education status		
Completed post-secondary	48	57.1
Some post-secondary	14	16.7
High school diploma or less	22	26.2
Hypertension	36	42.9
High cholesterol	30	35.7
Depression	28	33.3
Type 2 Diabetes	25	29.8
Gastroesophageal reflux	22	26.2
Osteoarthritis	14	16.7
Sleep apnea	14	16.7
Urinary incontinence	11	13.1
Cardiovascular disease	7	8.3

Note: n=84, SD= standard deviation, all data self-reported

4.2 Weight Loss Goals and Expectations

4.2.1 Impact of current weight on life. Bariatric surgery candidates' level of satisfaction with their current weight and the effect of their current weight on 20 health, quality of life, social functioning, aesthetic features, and self-image related factors were assessed. Bariatric surgery candidates were very dissatisfied with their current weight reporting a mean score of 1.3 ± 0.8 on a 1-10 Likert scale (1= very dissatisfied, 10= very satisfied). Current weight had a negative effect on 20 factors related to the health, quality of life, social functioning, aesthetic features, and self-image of bariatric surgery candidates (Figure 4.1). The effect of current weight on these 20 factors was rated on a 10 point Likert scale where 1=extremely negative effect of current weight to 10= extremely positive effect of current weight. On this scale, lower scores indicated a more negative impact of current weight on the life related factor, while positive scores were associated with current weight having a more positive effect on the life related factor. All 20 factors scored below the scale midpoint of 5.5. This indicates that current weight has a negative impact on the lives of bariatric surgery candidates. LSG candidates reported that fitness, health, and stress were most negatively affected by their current weight. Candidates' likability, attractiveness to their significant other, and assertiveness were reported to be the least negatively affected by current weight, although all of these factors still scored below the scale midpoint.

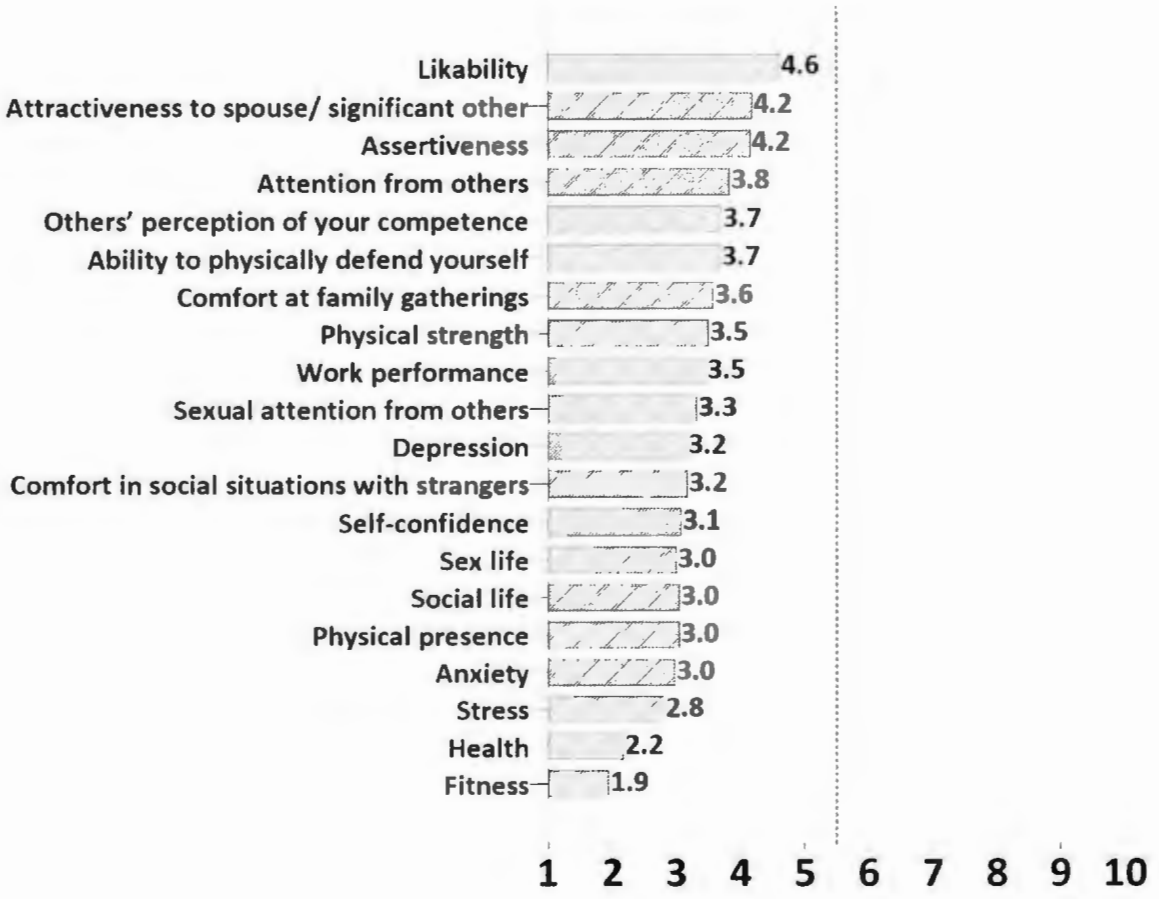


Figure 4.1. **Effect of current weight on factors related to health, quality of life, social functioning, aesthetic features, and self-image of LSG candidates in NL.** Evaluated on a 1-10 Likert type scale, 1= extremely negative effect of current weight, 10= extremely positive effect of current weight, n=84.

4.2.2 Critical points of weight gain. Critical points of weight gain in the lives of bariatric surgery candidates were explored. Participants were prompted with the phrase "My weight became a concern in my life during/ after..." before being presented with eleven identified critical periods of weight gain. This list of critical weight gain periods is presented in Appendix B. The eleven critical weight gain period categories were collapsed into major thematic categories during data analysis for simplicity and clarification of results. The category 'childhood', defined as critical weight gain period at less than 18 years of age, remained 'childhood'. The categories '1st', '2nd', '3rd', and '4th or higher' pregnancy were collapsed into the category 'pregnancy'. The categories 'personal illness or injury' and 'illness or injury of a close friend or family member' were collapsed into the category 'illness or injury'. The categories 'bereavement', 'left home', 'new job', and 'other lifestyle change' were collapsed into the category 'lifestyle change'. Finally, the small number of responses to the 'other' critical period of weight gain category were interpreted and included in the appropriate major category. For example, the response "adolescence" as an 'other' critical period of weight gain was included in the major category 'childhood', appropriate for any critical weight gain before the age of 18 years. The results were analyzed by gender to allow for an unbiased incorporation of the category 'pregnancy' as a critical point of weight gain for women.

Bariatric surgery candidates reported that illness or injury, childhood, and pregnancy were critical periods of weight gain in their lives. The majority of men seeking LSG (66.7%) described illness or injury to themselves or a person close to them creating a critical period of weight gain in their lives (Figure 4.2). About a quarter (26.7%) of men reported that they had first experienced weight gain in childhood, and 6.7%

attributed their weight gain to a lifestyle change such as leaving home, a new job, or bereavement. Childhood (36.5%) and pregnancy (28.2%) contributed most critically to weight gain histories of women (Figure 4.3). Illness or injury to themselves or someone close to them (22.4%) and lifestyle change (12.9%) were also reported to create critical weight gain periods for female bariatric surgery candidates.

Figure 4.2. **Critical points of weight gain in the lives of male LSG candidates in NL.** n=15.

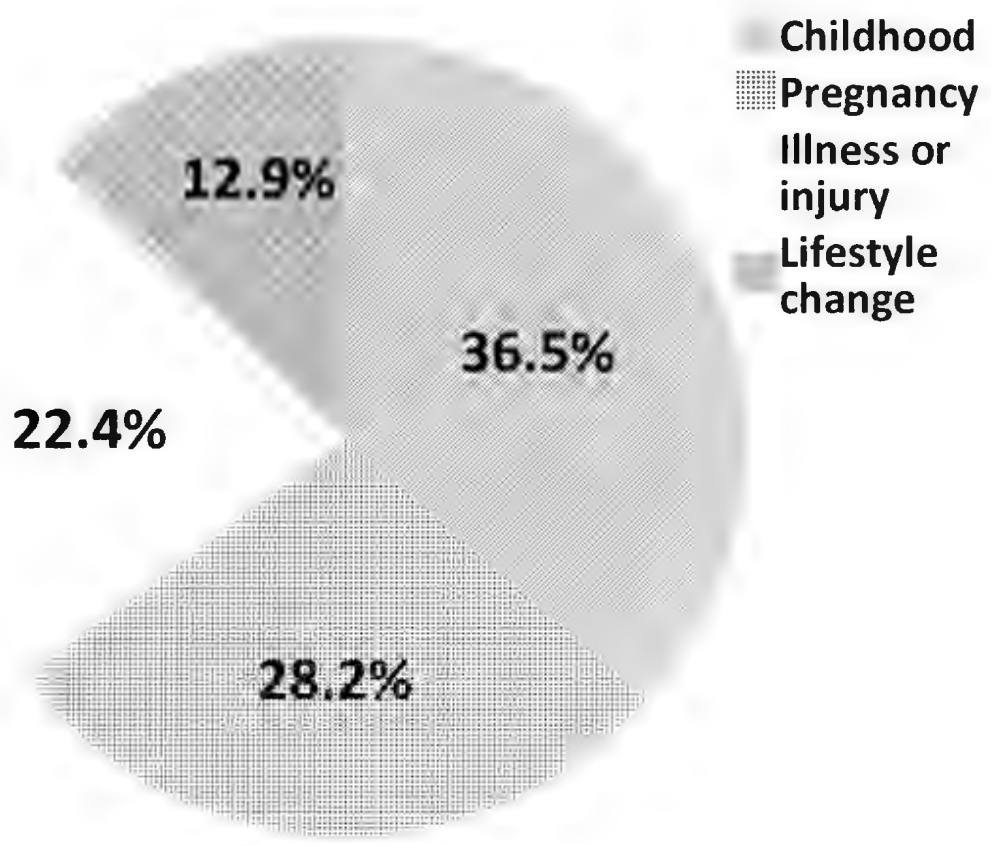


Figure 4.3. **Critical points of weight gain in the lives of female LSG candidates in NL.** n=69.

4.2.3 Goal weight choice. Health related factors, including medical conditions, physical comfort, and psychological health were rated as being the most significant influences on goal weight choice (Figure 4.4, Table 4.2). Bariatric surgery candidates reported mean Likert scale ratings of medical conditions, physical comfort, and psychological health to be 9.6, 8.9, and 8.3 respectively (1= not at all important, 10= very important). The Z values for these health related factors were Z= 4.49, Z= 2.80, and Z= 2.32 respectively (Z >2.0= significant). This indicates a significant, strong response to health related factors from survey respondents as being "very important" compared to the importance they attributed to other goal weight choice variables.

Appearance and specific weight related factors were reported to have an intermediate influence on the goal weight choice of LSG candidates. Appearance related influences on goal weight choice included specific body measurement, appearance, and clothes size which were rated 7.3, 6.8, and 6.7 respectively (1= not at all important, 10= very important). Specific weight related influences on goal weight choice included doctor or health professional recommended weight, weight below an important number, weight recommended by a chart, weight at a specific time in life, and weight after a previous weight loss effort. These factors were rated 7.3, 6.9, 6.5, 4.9, and 4.3 respectively (1= not at all important, 10= very important).

LSG candidates reported that social related factors were "not at all important" influences when selecting a weight loss goal. Social related factors included attractiveness to your significant other, weight of family or friends, weight of peers, and weight of a celebrity. These rated 3.6, 3.5, 3.5, and 1.7 on a 1-10 Likert scale respectively (1= not at all important, 10= very important). Significant Z values were

observed for the strength of the rating of attractiveness to significant other (Z=2.03), weight of peers (Z= 2.09), and weight of a celebrity (Z=3.93) indicating that these factors were "not at all important" influences on the goal weight choice of bariatric surgery candidates.

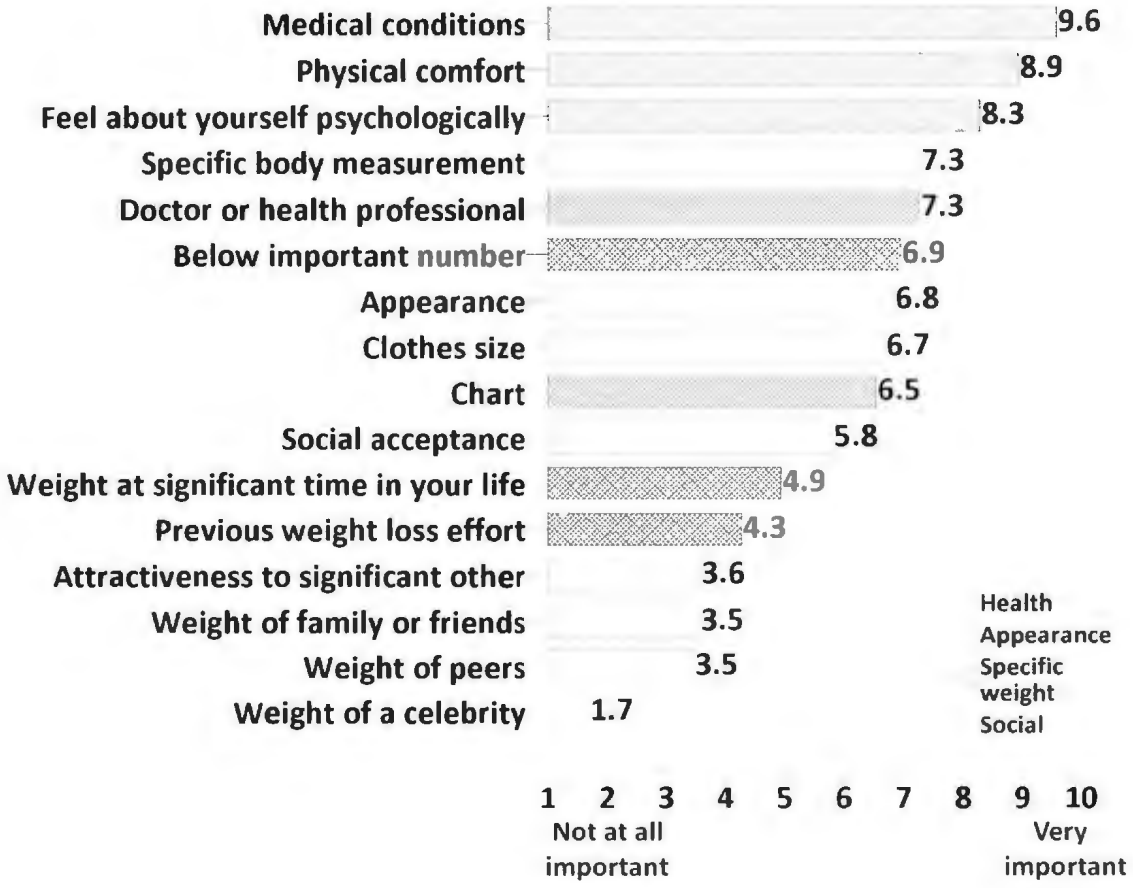


Figure 4.4. **Influence of health, appearance, specific weight and social related factors on the goal weight choice of LSG candidates in NL.** Likert type scale, 1= not at all important, 10= very important. n=84.

Table 4.2

One-sample Kolmogorov-Smirnov test for LSG patients' reasons for choosing a goal weight

Goal Weight Choice Factor	n	Mean ± SD	Kolmogorov-Smirnov Z
Medical conditions	83	9.6 ± 0.9	4.49*
Physical comfort	83	9.0 ± 1.4	2.80*
Feel about yourself psychologically	82	8.4 ± 2.1	2.32*
Specific body measurement	81	7.4 ± 2.6	1.67
Doctor or health professional	81	7.4 ± 2.3	1.95
Below important number	81	7.2 ± 2.9	1.72
Appearance	82	6.9 ± 1.9	1.12
Clothes size	82	6.7 ± 2.2	1.31
Chart	79	6.6 ± 2.9	1.73
Social acceptance	81	5.9 ± 2.9	1.37
Weight at a significant time in your life	78	5.0 ± 3.2	1.58
Previous weight loss effort	77	4.5 ± 2.9	1.39
Attractiveness to significant other	77	3.7 ± 3.0	2.03*
Weight of family or friends	80	3.6 ± 2.8	1.89
Weight of peers	81	3.4 ± 2.6	2.09*
Weight of a celebrity	79	1.8 ± 1.7	3.93*

Note: * = significance (Z >2.0)

4.2.4 Weight loss expectations. The postoperative weight loss expectations of bariatric surgery candidates were evaluated in four descriptive categories; dream weight, happy weight, acceptable weight, and disappointed weight. Goal weight after surgery and current weight before surgery were also examined.

The mean ± SD current weight of LSG candidates in NL was 136.7 ± 24.3 kg (301.4 ± 53.5 lbs), which corresponds to a BMI of 49.0 ± 7.0 kg/m^2 (Table 4.3). Bariatric surgery candidates reported mean ± SD goal, dream, happy, acceptable and disappointed weights after weight loss surgery of 74.7 ± 13.1 kg, 71.1 ± 11.7 kg, 80.0 ± 14.2 kg, 86.2 ± 17.0 kg and 105.6 ± 21.0 kg respectively. To achieve these weights, candidates would be required to lose between 65.6 ± 19.4 kg and 31.0 ± 18.1 kg of total body weight or 47.3% ± 8.2 % to 22.1% ± 11.7 % of their total weight. This corresponds to a mean ± SD decrease in BMI of between 23.6 ± 6.7 kg/m^2 and 11.0 ± 6.4 kg/m^2.

Based on each individual's ideal body weight, the percent excess weight losses (%EWL) required to meet their postsurgical goal, dream, happy, acceptable, and disappointed weight loss expectations were 84.2 ± 11.8 %, 88.7 ± 11.3 %, 76.4 ± 12.8 %, 68.2 ± 16.1 %, and 40.6 ± 21.0 % respectively (Figure 4.5). A one-way between-groups ANOVA was conducted to compare the %EWL expectations of bariatric surgery candidates in the weight loss expectation categories goal, dream, happy, acceptable, and disappointed. There was a statistically significant difference at the $p<0.05$ level in %EWL for the weight loss expectation categories: $F(4, 403)= 130.2$, $p=0.000$. There was a large actual difference in mean scores between groups. The effect size, calculated using eta squared, was 0.56. Post-hoc comparisons using the Tukey HSD test indicated that the mean scores for happy weight (M=76.4, SD=12.8), acceptable weight (M=68.2,

SD=16.1), and disappointed weight (M=40.6, SD=21.0) were significantly different from each other as well as from goal weight (M= 84.2, SD= 11.8) and dream weight (M=88.7, SD=11.3). Goal weight did not differ significantly from dream weight. Figure 4.5 depicts the %EWL expectations of LSG candidates in relation to the clinically expected 45-60 %EWL from LSG surgery (Victorzon, 2012). The mean ± SD %EWL expectations of bariatric surgery candidates exceeded the clinically expected %EWL from LSG in all weight loss categories except disappointed weight. LSG candidates in NL would be "more than disappointed" with achieving clinically successful postoperative weight loss. When considered from the perspective of percent excess BMI loss, candidates for LSG in NL dreamed of a 99.3 ± 13.0 % loss of excess BMI after surgery, and would be less than disappointed with 45.3 ± 23.3 % excess BMI loss.

Table 4.3

Weight loss expectations of LSG candidates in NL

Weight category	**Weight**, lbs (mean ± SD)	**Weight**, kg (mean ± SD)	**BMI**, kg/m^2 (mean ± SD)	**Absolute weight loss**, kg (mean ± SD)	**Percent excess weight loss**, % (mean ± SD)	**Percent total weight loss**, % (mean ± SD)	**Change in BMI**, kg/m^2 (mean ± SD)	**Percent excess BMI loss**, % (mean ± SD)
Current	301.4 ± 53.5	136.7 ± 24.3	49.0 ± 7.0	–	–	–	–	–
Goal	164.6 ± 28.8	74.7 ± 13.1	26.7 ± 3.1	61.9 ± 18.1	84.2 ± 11.8%	44.7 ± 7.8%	22.3 ± 6.3	94.3 ± 13.9
Dream	156.6 ± 25.8	71.1 ± 11.7	25.4 ± 2.8	65.6 ± 19.4	88.7 ± 11.3%	47.3 ± 8.2%	23.6 ± 6.7	99.3 ± 13.0
Happy	176.3 ± 31.3	80.0 ± 14.2	28.6 ± 3.5	56.6 ± 17.0	76.4 ± 12.8%	40.8 ± 8.2%	20.4 ± 6.0	85.4 ± 14.2
Acceptable	190.1 ± 37.4	86.2 ± 17.0	30.9 ± 4.6	50.4 ± 17.0	68.2 ± 16.1%	36.4 ± 9.3%	18.1 ± 6.0	76.2 ± 17.9
Disappointed	232.7 ± 46.3	105.6 ± 21.0	38.0 ± 6.6	31.0 ± 18.1	40.6 ± 21.0%	22.1 ± 11.7%	11.1 ± 6.4	45.3 ± 23.3

Note: n=84

[a] Current= current weight (self-reported), Goal= goal weight, Dream= dream weight "a weight you would chose if you could weigh whatever you wanted", Happy= happy weight, "a weight you would be happy to achieve", Acceptable= acceptable weight "a weight you would not be happy with but one you could accept", and Disappointed= disappointed weight "a weight you would not view as successful in any way"

[b] Absolute weight loss= (current weight – weight loss expectation category weight), Percent excess weight loss= (current weight–weight loss expectation category weight) ÷ (current weight– ideal body weight) x 100, Percent total weight loss= [1– (weight loss expectation category weight ÷ current weight)] x 100, Change in BMI= (current BMI– weight loss expectation category BMI), Percent excess BMI loss= [(BMI–weight loss expectation category BMI) ÷ (BMI–24.99)] x 100

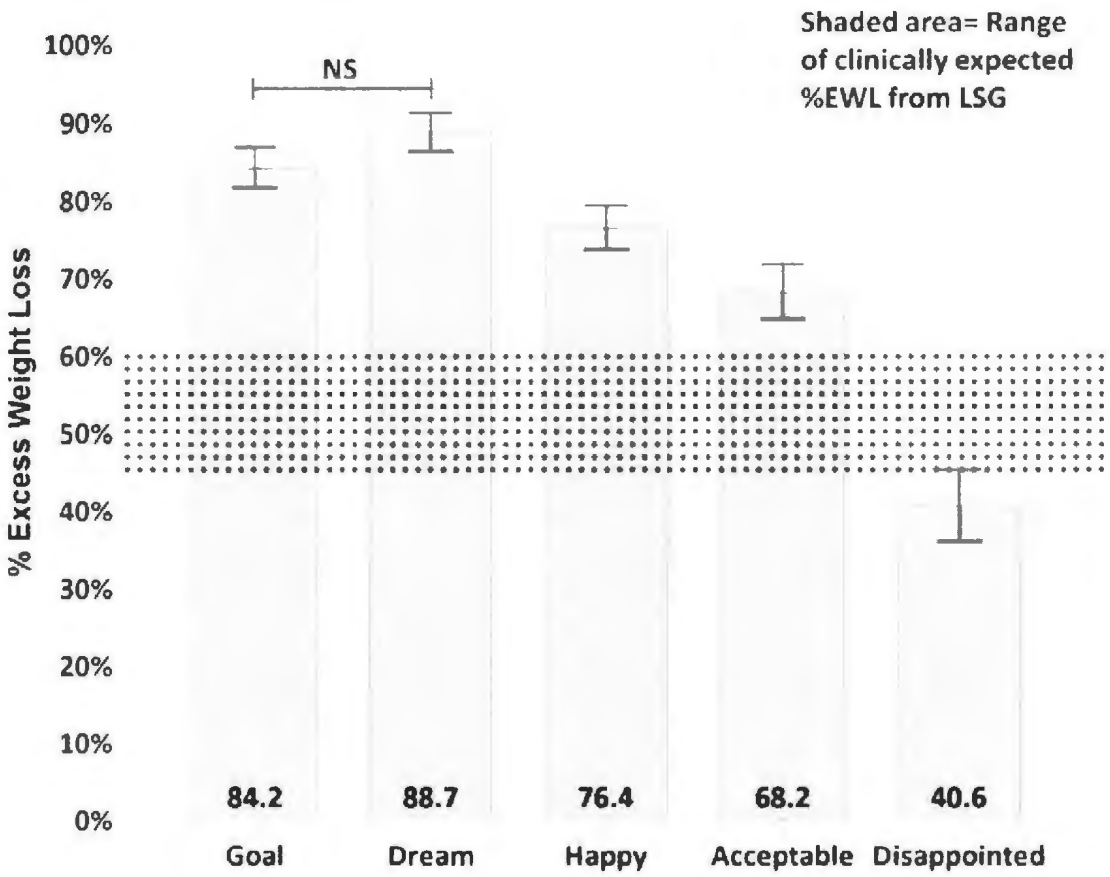


Figure 4.5. **Weight loss expectations and clinically defined surgical success in 82 LSG candidates in NL.** Percent excess weight losses (%EWL) are significantly different ($p<0.05$-$p<0.003$) between all weight loss categories, except goal and dream weights. Confidence interval 95%. The number of responses do not correspond to the overall sample size of n = 84. The difference is due to missing values on some statements (the number missing never exceeded n=2). NS= no significant difference.

4.2.5 Time to weight loss and achievement beliefs. The weight loss achievement beliefs and the expected time to meet weight loss expectations of LSG candidates in NL were explored. The majority of bariatric surgery candidates believed that they would achieve their dream, happy and acceptable weights post-surgery, and that these achievements would happen in less than two years (Table 4.4). Candidates were asked to report if they "believed that weight loss surgery would allow them to achieve" their dream, happy, and acceptable postoperative weight expectations. Only dichotomous, yes/no, answers were permitted. Nearly all bariatric surgery candidates, 90.4%, reported that weight loss surgery would allow them to achieve their dream weight, 98.8% their happy weight, and 97.6% their acceptable weight. Respondents were then asked to indicate the timeframe in which they expected their dream, happy, and acceptable weight loss to occur. LSG candidates in NL expected their weight loss expectations to be met within two years after surgery, although some variation was reported in each weight loss category. The most modest of the three weight loss categories, acceptable weight, was expected to be achieved in less then one year postoperatively by 64.3 % of respondents, while 31.0 % reported expecting to achieve it in 1-2 years. The timeframe to achieve happy weight was almost evenly split between less than one year for 44.6% of candidates, and 1-2 years for 48.2%. The timeframe to achieve dream weight was more modest, with 50.0 % reporting 1-2 years, and 35.7 % reporting they expected to achieve it in less than one year. Candidates were also given the option to respond that they never expect to achieve their dream, happy or acceptable weight. Only 8.3% of weight loss surgery candidates reported that they did not expect to

achieve their dream weight after surgery. All respondents expected to achieve their happy weight in some time frame after surgery.

Table 4.4

Expected time to weight loss and weight loss expectations achievement beliefs of LSG candidates in NL

Weight Category	**Believe weight loss surgery will allow you to achieve this weight?**	**How long after surgery will you achieve this weight?**			
	Yes (%)	≤ 1 year (%)	1-2 years (%)	≥ 2 years (%)	I never expect to achieve this weight (%)
Dream	90.4	35.7	50.0	6.0	8.3
Happy	98.8	44.6	48.2	7.2	0.0
Acceptable	97.6	64.3	31.0	3.6	1.2

Note: n=84

4.3 Body Shape Expectations

4.3.1 Expectations of body shape. The postoperative body shape expectations of female and male LSG candidates in NL were assessed. Expectations in the categories goal, dream, happy, acceptable, and disappointed as well as current perceived body shape were evaluated as the mean ± SD number of body silhouettes on a continuous 1-9 silhouette scale (1= leanest silhouette to 9=largest silhouette) (Figure 4.6). Female LSG candidates reported dream, happy, acceptable, and disappointed postoperative body shapes of 4.1± 1.0 silhouettes, 5.0± 0.80 silhouettes, 5.3± 0.98 silhouettes, and 6.9± 1.0 silhouettes respectively. They set their body shape goal after bariatric surgery at 4.3± 0.78 silhouettes, and perceived their current weight body shape to correspond to silhouette 8.2± 0.80. Male bariatric surgery candidates indicated dream, happy, acceptable and disappointed body shape expectations of 4.5± 0.83 silhouettes, 5.2± 0.77 silhouettes, 6.0± 1.2 silhouettes, and 7.4± 0.85 silhouettes. They reported a mean± SD goal body shape of 5.8± 1.7 silhouettes, and perceived their current shape to be 8.6± 0.51 silhouettes.

Male and female bariatric surgery candidates reported significantly different mean expectations of goal and acceptable postsurgical body silhouettes. An independent samples t-test was conducted to compare the mean postoperative goal body silhouettes for male and female bariatric surgery candidates. There was a significant difference in scores for males (mean (M)= 8.60, SD=0.51) and females (M= 8.17, SD=0.80, p=0.004). Another independent samples t-test was conducted to compare the mean acceptable postoperative body silhouette reported by male versus female bariatric surgery candidates. There was a significant difference in scores for males (M= 6.0, SD=1.2) and

females (M= 5.3, SD=0.98, p=0.029, 2-tailed, equal variances assumed). There were no significant differences between the mean ± SD dream, happy and disappointed postoperative figures selected by males and females in this sample. The difference in mean perceived current body shape selected by male and female bariatric surgery candidates was borderline significant (p=0.051, 2-tailed, equal variances assumed).

The relationship between current body shape, goal body shape, and evidence-based surgical outcome from LSG surgery for female surgical candidates in NL was explored (Figure 4.7). The goal body shape of women seeking LSG and its associated BMI were smaller than the clinically expected range of body figures and BMIs from this surgery. The goal body shape of female candidates corresponded to a BMI between 23.1 kg/m^2- 26.2 kg/m^2. The actual mean ± SD BMI of women seeking LSG was 48.8± 7.0 kg/m^2. This indicated that the body shape of females in this sample was larger than the largest figure depicted on the figure rating scale. Calculation indicated that the clinically expected %EWL from LSG corresponded to the achievement of postoperative BMIs between 26.4 kg/m^2- 44.4 kg/m^2 in this sample of women.

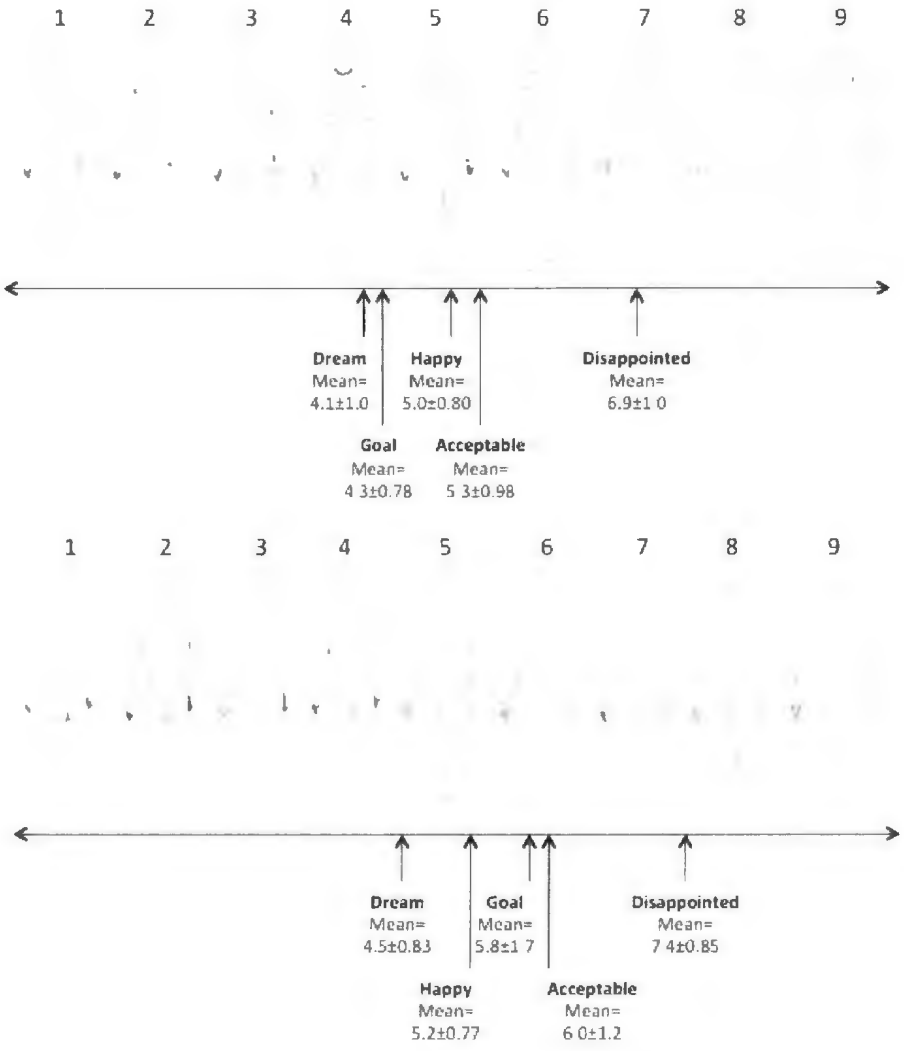


Figure 4.6. **Body shape expectations of male female and male LSG candidates in NL.** Results presented as mean ± SD number of body silhouettes, continuous 1-9 scale (1=leanest figure, 9= largest figure). n=69 women, n=15 men.

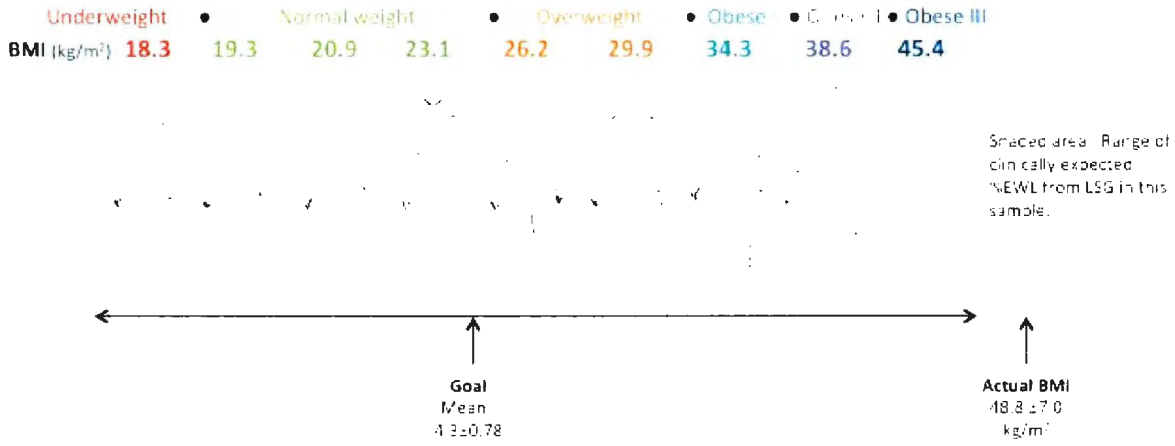


Figure 4.7. **The relationship of current body shape, goal body shape, and evidence-based surgical outcome from LSG surgery for female surgical candidates in NL.** Shaded area represents the 45%-60% EWL range from LSG in this population of female candidates. n=69 women.

4.3.2 Body image dissatisfaction. BID was calculated as candidates' current perceived body shape, minus their dream/ ideal body shape (Figure 4.8). The BID score for women seeking LSG surgery was 4.1±1.3 silhouettes. The BID score for men was 4.0±0.82 silhouettes. There was no significant difference in mean BID score for men and women seeking LSG surgery. Male and female bariatric surgery candidates were equally dissatisfied with their body image as reported by their body image dissatisfaction scores. Almost half (49.4 %) of LSG candidates incorrectly identified the silhouette associated with their actual BMI by under-estimating their true size.

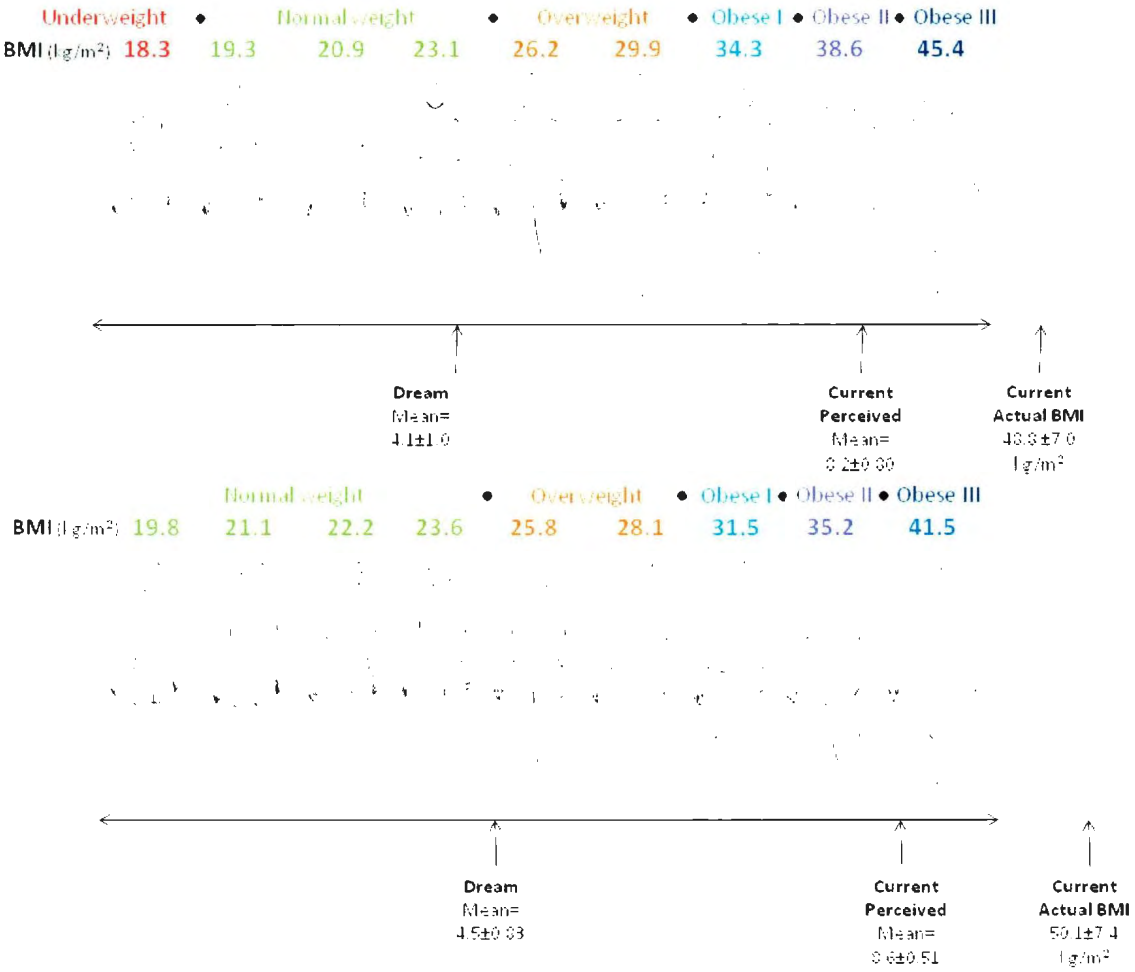


Figure 4.8. **Dream, current perceived and current actual body shape of male and female LSG candidates in NL.** n=84

Chapter 5: Discussion

The current study examined the postoperative weight loss and body shape expectations of potential LSG candidates in NL. It also investigated the impact of current weight on the lives of bariatric surgery candidates, critical points of weight gain in patients' lives, the importance of select factors in setting weight loss goals, weight loss achievement beliefs, and body image dissatisfaction.

The discussion of findings is organized as a logical interpretation of study results to address each successive research question. The first section describes the demographic and obesity-related comorbidity profile of study participants. The second section assesses the weight loss goals and expectations of surgical candidates, including their current weight, critical points of weight gain, goal weight choice factors, specific weight loss expectations, and time to weight loss achievement beliefs. The final section discusses the body shape expectation and body image dissatisfaction findings in this sample of LSG candidates in NL.

5.1 Demographic and Obesity-related Comorbidity Profile

The demographic and obesity-related profile of bariatric surgery candidates in NL was comparable to bariatric surgery populations across Canada. Similarities in the age, proportion of female patients, education level, and type and prevalence of common obesity-related comorbidities were observed (Lau et al., 2007; Padwal et al., 2012).

The 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children indicate that bariatric surgery is appropriate for adults who fail non-surgical intervention and who have a BMI $\geq$ 40.0 kg/m^2 or a BMI of 35.0-39.9 kg/m^2 with a major obesity-related comorbidity (Lau et al., 2007). The mean BMI of the study population was 49.0 $\pm$ 7.0 kg/m^2, signifying that LSG candidates in NL fell within the Canadian practice guidelines for this procedure. LSG surgery candidates were identified by the multi-disciplinary Bariatric Care Clinic at Eastern Health.

A recent study by Padwal and colleagues (2012) presented the characteristics of populations eligible for and receiving bariatric surgery in Canada. The demographic and obesity-related comorbidity characteristics of the population in the current study were comparable to the Canadian profile presented in this paper. For example, the mean age, 43.6 $\pm$ 8.7 years, and the high percentage of female participants, 82%, evaluated in the present study was directly comparable to the mean age, 43.6 $\pm$11.1 years, and percentage of female surgical patients, 82%, observed in the nation-wide analysis. Interestingly, these authors identified socioeconomic advantages, such as being more educated, in those receiving bariatric surgery compared to the larger population of Canadians eligible to receive this treatment. This trend was also observed in the present study, wherein 57.1%, of LSG candidates reported completing a post-secondary education.

The self-reported obesity-related comorbidity profile of LSG candidates in NL was comparable to the typical comorbidity profile of obese individuals (Picot et al., 2009). The prevalence of hypertension, high cholesterol, depression, and Type 2 Diabetes in this sample was 42.9%, 35.7%, 33.3%, and 29.8% respectively. A review of

the clinical effectiveness and cost-effectiveness of bariatric surgery for the treatment of morbid obesity also identified these comorbidities as being among the most common in individuals seeking bariatric surgery (Lau et al., 2007; Picot et al., 2009).

5.2 Weight Loss Goals and Expectations

Investigation of the weight loss expectations of bariatric surgery candidates was a primary focus of this research study. This study also aimed to facilitate a more complete understanding of the motivations and challenges that influence weight loss expectations. This was evaluated through participants' self-report of the impact of current weight on their life, critical points of weight gain in life, influences on their goal weight choice, and weight loss achievement beliefs as a complement to the specific postoperative weight loss expectations reported.

5.2.1 Impact of current weight on life. Bariatric surgery candidates were found to be very dissatisfied with their current weight, and reported that it negatively impacted physical, social, and psychological aspects of their lives. A comprehensive literature review revealed that no studies using the GRWQ in bariatric surgery populations (Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; White et al., 2007) have reported candidates' perceptions of the impact of preoperative weight on their lives. The majority of studies using the GRWQ have omitted the use of Part I of the tool entirely, including the impact of current weight on life section, focusing instead on the specific weight loss expectations in Part II (Dalle Grave et al., 2005; Provencher et al., 2007;

Teixeira et al., 2004). Inclusion of the entire survey provides a more comprehensive understanding of patient levels of satisfaction with current weight and future expectations related to weight loss.

As expected, bariatric surgery candidates in NL were very dissatisfied with their preoperative weight. When asked to rate their satisfaction with current weight on a scale from 1-10 (1= very dissatisfied, 10= very satisfied) individuals seeking bariatric surgery reported a mean ± SD level of satisfaction with current weight of 1.31 ± 0.84. This low score, coupled with a very small standard deviation, suggested a strong consensus among LSG candidates that their current weight was "very dissatisfying". Furthermore, LSG candidates reported that their current weight had an "extremely negative" to "negative" impact on 20 factors related to physical, social, and psychological aspects of their lives. Rated on a scale from 1 to 10 (1= extremely negative, 10= extremely positive) all of the health, quality of life, social functioning, aesthetic features, and self-image related factors scored below the scale midpoint of 5.5. This indicated a pervasive negative impact of preoperative weight on multiple aspects of candidates' lives. "Fitness", "health", and "stress" were reported to be the most negatively impacted by current weight, while the social and psychological factors "likability", "attractiveness to significant other", and "assertiveness" affected least negatively by preoperative body weight. These findings could provide insight into why individuals seeking bariatric surgery have gained weight, thus leading to a better understanding of the root causes of weight gain and the development of targeted interventions to address these causes.

While there are no GRWQ studies with which to directly compare these findings, they are generally consistent with quality of life findings in bariatric surgery populations using other survey instruments. This body of literature suggests that obese and morbidly obese individuals suffer impaired quality of life, social functioning, and adverse health outcomes due to their excess weight (Padwal et al., 2011; Picot et al., 2009; Sarwer et al., 2008; WHO Consultation on Obesity, 2000). A recent review of the literature outlining the relationship between extreme obesity, quality of life, and sexual functioning concluded that weight reduction was associated with improved psychosocial functioning, health-related quality of life, reproductive and sexual health, and sexual functioning (Sarwer et al., 2008). The observation that candidates for LSG surgery in NL are very dissatisfied with their current weight, and that current weight negatively impacts their health, quality of life, social functioning, aesthetic features, and self-image are consistent with the conclusions drawn from this large-scale literature review.

In summary, the present investigation was the first to report the results of the impact of current weight on life using the GRWQ. Not surprisingly, LSG candidates in NL reported being very dissatisfied with preoperative weight. Current weight was seen to negatively impact physical, social, and psychological aspects of their lives. These findings are consistent with a greater body of research examining the impact of extreme obesity on quality of life.

5.2.2 Critical points of weight gain. The present study found that men and women seeking bariatric surgery experienced different critical periods of weight gain in

their lives. Critical time periods included illness or injury, childhood, and pregnancy. This study provided a preliminary examination of what bariatric surgery candidates perceived to be the most critical time periods of weight gain in their lives.

The current study identified that the majority of men seeking LSG (66.7%) reported illness or injury to themselves or a person close to them as creating a critical period of weight gain in their lives, that 26.7% reported first experiencing weight gain in childhood, and that 6.7% attributed their weight gain to a lifestyle change such as leaving home, a new job, or bereavement. Most women (36.5%) reported childhood as their critical period of weight gain. Pregnancy (28.2%), illness or injury to themselves or a person close to them (22.4%), and lifestyle change (12.9%) also created critical weight gain periods for women. This suggests that obesity prevention programs may be most beneficial and effective when specifically targeted for critical periods of weight gain. For example, 28.2% of women cited pregnancy created a critical period of weight gain in their lives. Perinatal and postpartum emphasis on obesity prevention or a heightened awareness of increased risk of obesity after pregnancy, might help prevent critical weight gain for women in this time of life. On the other hand, the majority of men seeking bariatric surgery (66.7%) indicated that they gained weight after sustaining an illness or injury. Awareness of this common cause might present a good target for weight prevention programs, and suggests that men need more support and education to prevent weight gain after sustaining an illness or injury. This may have implications for a variety of stakeholders, such as workplace health and safety boards. About a quarter of men (26.7%) and over a third of women (36.5%) seeking bariatric surgery reported gaining a

critical amount of weight in childhood. This finding supports the ongoing need for obesity prevention initiatives throughout childhood and adolescence.

In summary, bariatric surgery candidates reported that illness or injury, childhood, and pregnancy were critical periods of weight gain in their lives. These findings present targets for obesity prevention initiatives.

5.2.3 Goal weight choice. LSG candidates in NL reported that the selection of their postoperative goal weight was most influenced by health related factors, and least influenced by social related factors. The influences of select health, appearance, specific weight, and social related factors on the goal weight choice of bariatric surgery candidates were examined. LSG candidates were most likely to select a weight loss goal based on the influence of "medical conditions", "physical comfort", and "how they feel about themselves psychologically" at a certain weight. These factors scored 9.6, 8.9, and 8.3 respectively (1= not at all important, 10= very important). Based on statistical analyses, these health related factors scores were significantly higher than the scores of all the other goal choice influence factors.

These results are consistent with the existing literature on factors influencing the goal weight choice of bariatric surgery candidates. A population of bariatric surgery candidates in Alberta, Canada also significantly rated "medical conditions" as the most important influence on their goal weight choice (Karmali et al., 2010). In this study, "medical conditions" scored 9.5 ± 1.1 on a Likert scale (1= not important, 10=most important) and had a significant Z value of 2.381 in a modified 13-factor analysis of

influences on goal weight choice from the GRWQ. This is in contrast to the only other report of influences on goal weight choice in the literature by Foster and colleagues in 1997. In this study, obese women seeking behavioral weight loss therapy rated "appearance" and "physical comfort" as being the most important of 16 factors influencing the selection of their goal weight. These factors rated 9.2 ± 1.3 and 9.1 ± 1.6 on a Likert type scale respectively (1= not at all important, 10= very important). Differences in the study population and intervention examined make these findings less generalizable to the present analysis. The study by Karmali and colleagues (2010) was also performed in a population of bariatric surgery seeking adults in Canada, and thereby presents the most important comparison point for the present work, providing support for the finding that individuals set weight loss goals for health related reasons.

Social related factors including "attractiveness to your significant other", "weight of family or friends", "weight of peers", and the "weight of a celebrity" were significantly associated with having no important influence on the goal weight choice of bariatric surgery candidates. Karmali and colleagues (2010) also observed that participants rated psychosocial related factors including "weight of a celebrity", "weight spouse finds attractive", and "weight of a peer" as the least important influences on the goal weight choice. In contrast to the current study findings, the low scores of social related factors did not yield statistically significant values. This may have been due to small sample size, made even smaller due to Kolmogorov-Smirnov analysis by surgery type subgroup (n=23, and n=22). The current study thereby confirms and adds to the research findings of these researchers by providing cross-sectional evidence that a completely separate

population for bariatric surgery candidates selects personal postoperative goal weight based on similar influences. Interestingly, social related factors were the least important influences on goal weight choice in bariatric surgery candidates in both of these analyses. This suggests that societal pressure and the media may be having less of an effect on this population of extremely obese, treatment seeking adults than other populations seeking weight loss.

In summary, bariatric surgery candidates reported that health related reasons were the primary motivation for selecting a weight loss goal. Postoperative weight loss goals were most strongly influenced by candidate's perceptions of "medical conditions", "physical comfort" and "psychological health". Social related factors had very little influence on weight loss goal choice. This has been observed in another population of bariatric surgery patients in Canada, despite contradictory findings in non-surgical weight loss populations.

5.2.4 Weight loss expectations. This study observed a dramatic disparity between the weight loss goals and expectations of bariatric surgery candidates in NL and what is clinically expected from LSG surgery. Unrealistic expectations have been consistently reported in the literature of individuals seeking both non-surgical and surgical weight loss interventions (Ames et al., 2005; Anderson et al., 2003; Dutton et al., 2010; Foster et al., 2001; Foster et al., 1997; Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; Masheb & Grilo, 2002; Provencher et al., 2007; Teixeira et al.,

2004; Wamsteker et al., 2009; White et al., 2007). This was also confirmed in this study of LSG candidates in NL, Canada.

Bariatric surgery candidates in the present study had very ambitious weight loss expectations. Other research investigating weight loss expectations in bariatric surgery population have observed the same trend (Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; White et al., 2007). LSG candidates in NL reported a mean postoperative goal weight of 74.7 ± 13.1 kg (164.6 ± 28.8 lbs), achievable only with an 84.2 ± 11.8 %EWL. Weight loss expectations reported by these candidates would require excess weight losses of 88.7 ± 11.3 %EWL for a dream weight, 76.4 ± 12.8 %EWL for a happy weight, 68.2 ± 16.1 %EWL for an acceptable weight, and 40.6 ± 21.0 %EWL for a disappointed weight. The %EWL expectations of bariatric surgery candidates exceeded the clinically expected 45-60 %EWL from LSG in all weight loss categories except disappointed weight (Victorzon, 2012). LSG candidates in NL would be "more than disappointed" with achieving clinically successful postoperative weight loss.

Two of the four studies examining weight loss goals and expectations in bariatric surgery populations also reported their findings in terms of %EWL. Kaly and associates (2008) determined the dream, happy acceptable, and disappointed %EWL expectations of GB or AGB surgery patients to be 89 ± 8 %EWL, 77 ± 9 %EWL, 67 ± 10 %EWL, and 49 ± 14 %EWL. These observations were remarkably close to the findings of the present study, despite differences in country, type of surgery reviewed, and sample size. The authors concluded the %EWL expectations of bariatric surgery patients in their study were unrealistic. They also noted that patients' most modest expectation, a disappointed

weight, was equivalent to what healthcare providers would consider a successful weight loss outcome from the GB or AGB surgery. Overall, this study supported the finding that LSG candidates in NL have unrealistic weight loss expectations, and also observed that bariatric surgery candidates will be disappointed with realistic surgical outcomes.

Karmali and colleagues (2010) observed expectations of 98.7 %EWL, 84.5 %EWL, 73.5 %EWL, and 54.8 %EWL for the dream, happy, acceptable and disappointed weights of LRYGB and LAGB patients. The present analysis, also conducted in the context of the Canadian healthcare system, found more modest weight loss expectations in a population of candidates for LSG surgery. For example, the happy weight observed by these researchers, equivalent to an 84.5 %EWL, was most similar to the dream weight, 88.7 ± 11.3 %EWL, desired by LSG candidates in NL, while the happy weight reported was more modest, 76.4 ± 12.8 %EWL. Karmali and colleagues (2010) indicated that their population was surveyed after intensive pre-surgical education, which included visual presentations, written materials, and private consultations with the multi-disciplinary team. LSG candidates in the present study had not received any formal preoperative education before being surveyed, and yet still presented with more modest weight loss expectations than the educated group. Differences in study design including the type of surgery evaluated, and the sample size may partially account for these differences. However, this unexpected finding may suggest that it is not only the frequency and intensity of surgical education, but also the focus of that education on weight loss expectations and clinically defined outcomes that impacts patient's expectations. In fact, these authors indicated that their findings directed changes in the

bariatric surgery education program in Alberta to emphasize clinically expected surgical outcomes and realistic expectations. Overall, this research supports the conclusion of the present study that bariatric surgery candidates have unreasonable weight loss expectations from bariatric surgery.

White and colleagues (2007) examined weight loss expectations in terms of percent total body weight loss. These researchers observed that GB patients expected total body weight losses of 52.6%, 45.2%, 38.2%, and 26.0% for dream, happy, acceptable and disappointed weights, respectively. Comparatively, the dream, happy, acceptable, and disappointed weight loss expectations of LSG candidates in the present study translated into desired total body weight losses of 47.3 ± 8.2%, 40.8 ± 8.2%, 36.4 ± 9.3%, and 22.1 ± 11.7% respectively. While these findings were slightly more modest, they are still within the standard deviation observed by White and colleagues (2007). White and associates (2007) also provided evidence for discrepancies between patients' actual weights and their weight loss expectations. The authors noted that these discrepancies were much greater than the total body weight loss generally obtained through GB surgery, cited as ~35%. These results also support the findings of the present research initiative that LSG candidates in NL have unrealistic weight loss expectations for bariatric surgery, and that candidates will be disappointed with clinically successful weight loss outcomes.

Finally, Heinberg and associates (2009) examined the weight loss expectation results of the GRWQ in terms of the discrepancy between 'realistic' weight loss from LRYGB, LAGB, and LSG surgery and patients' weight loss expectations. Unfortunately,

this made direct comparison of these results with the present study very difficult. These researchers reported discrepancies of 28.79 ± 13.21 kg to 13.70 ± 11.32 kg between what patients expected as the dream- acceptable weight loss outcomes from bariatric surgery, and the weight loss outcome that they could realistically achieve from these procedures. The authors noted that the average dream weight discrepancy expected in this population was equivalent to a 106 %EWL. Only patients' disappointed weight loss expectation discrepancy, -3.75 ± 20.70 kg, fell within what could be considered a realistic outcome from their bariatric surgery, indicating once more that patients would be disappointed with what are defined as clinically successful surgical outcomes. The authors noted that LSG surgery patients reported significantly larger weight loss expectation discrepancies than LRYGB and LAGB patients ($p<0.02$). This evidence suggested that patients seeking different types of bariatric surgery, including LSG, have unrealistic expectations of postoperative weight loss, and is consistent with the finding of the present study.

Evidence for the disparity between patient and therapy provider expectations of weight loss outcomes is also provided in the literature concerning the weight loss expectations of non-bariatric surgery patients. Unreasonably high weight loss expectations were highlighted in a number of different studies involving a variety of weight loss interventions and populations (Ames et al., 2005; Anderson et al., 2003; Dutton et al., 2010; Foster et al., 2001; Foster et al., 1997; Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; Masheb & Grilo, 2002; Provencher et al., 2007; Teixeira et al., 2004; Wamsteker et al., 2009; White et al., 2007). This consistency was observed despite differences in the sample size, country of origin, study design, and purpose of

these research initiatives. Evaluation of the weight loss expectations of non-bariatric surgery patients also supports the findings of the present study.

The present study observed that there was no significant difference ($p>0.05$) between what bariatric surgery candidates dream to achieve from surgery, and the postoperative weight loss goal that they set for themselves. This was a unique finding. A comprehensive literature review revealed that no other studies using the GRWQ have published results of a comparison between weight loss expectation categories (Heinberg et al., 2009; Kaly et al., 2008; Karmali et al., 2010; White et al., 2007). There is a lack of evidence and consistency in the literature surrounding weight loss expectations and their association with treatment adherence, attrition and weight loss outcomes. However, as outlined in Chapter 2.0 Literature Review, it has been hypothesized that unmet expectations could have a detrimental effect on treatment adherence, attrition and weight loss outcomes (Cooper & Fairburn, 2001). If this were the case, the finding that bariatric surgery candidates are setting their weight loss goals at the same level as their weight loss dreams could have huge implications for weight loss outcomes. The finding that goal and dream weights are not statistically significantly different has implications for bariatric surgery education, suggesting it should focus on establishing reasonable weight loss goals defined by clinically successful weight loss outcomes. The observation that there was no significant difference between the goal weight and dream weight of bariatric surgery candidates derived from a novel comparison of weight loss expectation categories that were performed in this study.

This research initiative observed that the dream, acceptable, and disappointed weights expected by LSG candidates in NL parallel current weight classifications. The dream BMI of bariatric surgery candidates, 25.40 ± 2.82 kg/m^2, fell between the upper limit of the normal BMI range, 18.5-24.9 kg/m^2, and lower end of the overweight BMI range, 30-34.9 kg/m^2. Candidates' acceptable weight BMI, 30.89 ± 4.62 kg/m^2, paralleled the threshold for obese Class I, 30-34.9 kg/m^2. The disappointed weight BMI of LSG candidates, 38.04 ± 6.56 kg/m^2, corresponded to the upper limit of obese Class II, 35-39.9 kg/m^2, or the threshold for morbid obesity, ≥40 kg/m^2. Essentially, this indicates that bariatric surgery candidates dream of having a normal weight, would accept a weight at the low end of obese, and would be disappointed if they were still considered to be in obese Class II or obese Class III after bariatric surgery. White and colleagues (2007) also noted that individual's weight loss expectations appeared to parallel weight recommendations. In their study population, dream weight corresponded to the cutoff for normal BMI, happy BMI, 27 kg/m^2, with the lower bound for overweight and acceptable BMI, 30 kg/m^2, with the lower bound for obesity. The finding of this trend in two such distinct studies suggests that individuals seeking bariatric surgery may be establishing their weight loss expectations based on what they perceive to be 'normal' weight. This makes sense in the context of the primary influences on goal weight choice, cited in the present study to be health related reasons. Karmali and colleagues (2010) reported that individuals seek bariatric surgery to decrease the burden of comorbidity in their lives. BMI classification is highly associated with risk of comorbidity, the severity of health risk increases as an individual's BMI increases (Belle et al., 2007). Therefore, it follows

that bariatric surgery candidates might establish their weight loss expectations at levels that would most reduce that health risk. Future research should explore individuals' expectations of health risk at different weights, and patients' knowledge of the health risk reductions associated with even modest weight losses of 5-10% body weight (Lau et al., 2007; Picot et al., 2009).

In summary, LSG candidates in NL have unrealistic expectations of weight loss after bariatric surgery. There is a dramatic disparity between the weight loss goals and expectations of bariatric surgery candidates in NL and what is clinically expected from LSG surgery.

5.2.5 Time to weight loss and achievement beliefs. This study performed a novel evaluation of the time to weight loss and weight loss achievement beliefs of bariatric surgery candidates in relation to their weight loss expectations. This evaluation concluded that the majority of bariatric surgery candidates believed that 'yes', they would achieve their dream (90.4%), happy (98.8%), and acceptable (97.6%) postoperative weight loss expectations. As this was a new study question, there were no points of comparison for these achievement beliefs in the literature. These findings provide preliminary evidence that bariatric surgery candidates believe they will achieve their weight loss expectations. From the perspective of the impact of weight loss expectations on outcomes, the strong belief of bariatric surgery candidates that they will achieve their weight loss goals could result in either serious dissatisfaction with treatment outcome or strong motivation to continue to pursue weight maintenance behaviors (Crawford &

Glover, 2012). More research is needed to clarify the impact of weight loss expectations on bariatric surgery outcomes, which may have implications for how these preliminary observations are interpreted. This research could be performed using a longitudinal cohort study design to follow patients over time and assess expectations and outcomes.

LSG candidates in NL reported that they expect to achieve their weight loss expectations in ≥2 years after surgery. The literature supports that maximal weight loss after bariatric surgery occurs within 1-2 years of the operation (Picot et al., 2009). However, as previously discussed the dream, happy, and acceptable weight loss expectations of LSG candidates in NL were outside the range of clinically expected weight loss from this procedure. It is therefore unlikely that the LSG candidates sampled would achieve their weight loss expectations at any point in time after surgery. Only 8.3% of candidates surveyed indicated that they "never expect[ed]" to achieve their dream weight. Every candidate surveyed, 100%, reported that they expect to achieve their happy weight at some point after surgery. These beliefs indicate that very few patients are realistic about the weight loss that bariatric surgery can provide for them, although they seem to understand the timeframe in which the majority of weight loss occurs postoperatively.

In summary, this study provides new preliminary evidence that bariatric surgery candidates believe they will achieve their weight loss expectations, and that this weight loss will occur in less than two years postoperatively.

5.3 Body Shape Expectations

5.3.1 Expectations of body shape. This study provided a description of the body shape expectations of bariatric surgery candidates in relation to their expectations of postoperative weight loss. Findings indicated that bariatric surgery candidates have unrealistic postoperative body shape expectations, and that female candidates idealize thinner body shapes then those associated with clinically expected weight loss from LSG. The present study employed an innovative approach to the analysis of body image and body image disturbance in the bariatric surgery population by expanding the definition of body shape expectations to include the body shapes that candidates perceived in association with their dream, happy, acceptable, and disappointed weight loss expectations. A comprehensive review of the literature revealed only three studies that have used the SFRS to evaluated body image in bariatric surgery patients (Munoz et al., 2010; Neven et al., 2002; Song et al., 2006). These studies investigated expectations only in the context of current and ideal body shape, and provide the closest point of comparison for the present findings.

The present study offers a descriptive profile of the body shapes that extremely obese persons seeking surgical weight loss therapy idealize after surgery, and expect to achieve post massive weight loss. To the best of our knowledge, no research findings have been published that profile the ***body shape expectations*** of bariatric surgery candidates. In the current study, the dream, happy, acceptable, and disappointed body shape expectations of men and women seeking bariatric surgery were evaluated. Findings were analyzed by gender due to the gendered nature of the SFRS survey tool

(Stunkard et al., 1983). The current study findings suggest that the dream, happy, acceptable, and disappointed body shape expectations of men and women seeking bariatric surgery were represented by successively larger silhouette selections. A similar trend has been observed in ***weight loss expectation*** studies that did not explore body shape expectations (Foster et al., 1997; Kaly et al., 2008; Karmali et al., 2010). The dream, happy, acceptable, and disappointed postoperative body shape expectations of female candidates corresponded to silhouettes 4.1 ± 1.0, 5.0 ± 0.80, 5.3 ± 0.98, and 6.9 ± 1.0 respectively (1= leanest silhouette,9= largest silhouette). Men seeking LSG surgery reported dream happy, acceptable, and disappointed body shape expectations of 4.5± 0.83 silhouettes, 5.2± 0.77 silhouettes, 6.0± 1.2 silhouettes, and 7.4± 0.85 silhouettes respectively.

As a reminder to the reviewer, no studies have focused on all four categories of body shape expectation reported in this study. However, body shape has been explored in a very limited number of studies in the context of current perceived body shape and ideal body shape (Munoz et al., 2010; Neven et al., 2002; Song et al., 2006), although Munoz and colleagues (2010) were the only authors to numerically report the ideal and current perceived body shapes observed in their study. Ideal body shape will provide a point of comparison to the dream body shape expectation evaluated in the present study, and current perceived body shapes will also be compared. The dream body shapes reported by men and women in the present study were consistent with the ideal body silhouette communicated by a population of RYGB patients in the USA (Munoz et al., 2010). Munoz and colleagues (2010) observed that the ideal body silhouette of RYGB patients

was 4.13 ± 0.74 (1= leanest silhouette,9= largest silhouette). The dream body shapes indicated by female and male candidates for LSG in NL were, 4.1 ± 1.0 silhouettes and 4.5± 0.83 silhouettes, respectively. A comparison of these dream/ideal body shape observations reveals that they were very similar, as indicated by overlapping standard deviations. These researchers concluded as part of their research that the ideal silhouette score of RYGB patients represented an unrealistic postoperative body shape. The comparability of ideal body shape findings in that study with the dream body shapes observed in the present work, lends support to the conclusion of the present analysis that bariatric surgery candidates in NL have unrealistic body shape expectations. The ideal body silhouette of RYGB patients reported by Munoz and colleagues (2010) is the only piece of SFRS silhouette expectation from a bariatric surgery population that is available in the literature as a comparison point for the present study. Unfortunately, Neven and associates (2002) did not report specific SFRS scores in their publication, and Song and colleagues (2006) dramatically modified the SFRS for their research, making the specific scale scores that they reported non-comparable with the present study. The primary findings of these works will be discussed in relation to body image in the following section.

This study determined that male and female bariatric surgery candidates have significantly different perceptions of goal and acceptable postoperative body shapes. The goal postoperative body shape of men, 5.8± 1.7 silhouettes, was observed to be significantly higher (p=0.004) than that of women, 4.3± 0.78 silhouettes. In relation to their other body shape expectations, the mean goal body shape of men fell between what

they would be "happy to achieve" from surgery, and a body figure that they could "accept" as a surgical outcome. Comparatively, women's goal postoperative body shape was most closely associated with the body shape they "dream[ed]" of achieving. Men's acceptable postoperative body shape, 6.0± 1.2 silhouettes, was represented by a significantly larger (p=0.029) silhouette than the acceptable shape reported by women, 5.3± 0.98 silhouettes. These findings suggest that men may have a more reasonable perception of achievable postoperative body shapes than women. This could indicate that men are more likely to be satisfied with their final body shape after surgery, and perhaps enjoy improved body image satisfaction. This observation is consistent with a number of studies in bariatric surgery populations, which have noted gender differences in perceived body image, perceptions of desirable body shape, and body consciousness (Bays et al., 2009).

Female bariatric surgery candidates in NL were found to idealize thinner body shapes than are realistically achievable from LSG surgery. This was determined by comparing the range of BMIs that would result from a 45-60 %EWL in this sample of women to the BMI of the silhouette representing their mean goal body shape (Bulik et al., 2001). The goal body shape of female candidates corresponded to an SFRS silhouette with a BMI of 23.1 kg/m^2- 26.2 kg/m^2. The actual mean ± SD BMI of women in this sample was 48.8± 7.0 kg/m^2, or larger than the largest figure depicted on the figure rating scale. Calculation indicated that the clinically expected %EWL from LSG corresponded to the achievement of postoperative BMIs between 26.4 kg/m^2- 44.4 kg/m^2 in this sample of women. It is therefore apparent that female LSG candidates have misperceptions

concerning the body shape that they will achieve post surgery, and that they idealize silhouettes far below those attainable with clinically successful weight loss. This finding could have troubling consequences for postoperative weight loss outcomes, as it has been hypothesized that unmet goals can undermine behavior maintenance, treatment adherence, and ultimately surgical success (Cooper & Fairburn, 2001; Crawford & Glover, 2012).

Unrealistic body shape expectations and body shape perception among bariatric surgery patients presents a new and potentially very effective target for bariatric surgery education. This issue could be addressed using an educational tool based on the SFRS silhouettes designed to emphasize clinically expected postoperative body shapes. A visual representation of the range of body silhouettes at what is considered clinically successful weight loss could be incorporated into existing pre-surgical education programs materials in an effort to improve unrealistic body shape expectations. A poster or presentation slide indicating the range of expected silhouettes after surgery could introduce adults seeking this intervention to the concept of a reasonable postoperative body shape more easily than a discussion of weight-related numerical outcomes. This type of educational tool does not exist, but could be examined as a means of addressing unrealistic expectations from bariatric surgery. Studies have noted that younger, Caucasian women with higher BMIs seem to have the most unrealistic postoperative weight loss expectations and idealize thinner body images (Kaly et al., 2008; Provencher et al., 2007; Teixeira et al., 2004). A tool visually representing body shape in an effort to

manage unrealistic expectations may be particularly appropriate for this subpopulation of bariatric surgery seekers.

5.3.2 Body image dissatisfaction. Preoperative body image dissatisfaction was observed in bariatric surgery candidates in NL. Participants in the present study reported a discrepancy of 4.1 ± 1.3 silhouettes between their perceived current body shape and ideal body shape. This discrepancy measure is also known as the body image dissatisfaction (BID) score. When interpreting the BID score, the greater the discrepancy between perceived current and ideal body shape, the greater the degree of body image dissatisfaction experienced (Williamson et al., 1993). The BID score in the present study was a positive number. This indicates that the body image dissatisfaction of bariatric surgery candidates was experienced in the direction of desiring a smaller, not a larger, silhouette.

These findings were consistent with other studies that have applied the SFRS in bariatric surgery populations (Munoz et al., 2010; Neven et al., 2002; Song et al., 2006). However, only one article was found to have published BID scores from the SFRS with which to compare present study findings (Munoz et al., 2010). In their prospective survey analysis of changes in desired body shape after bariatric surgery, Munoz and colleagues (2010) reported that RYGB patients had a baseline BID score of 4.16±1.75 silhouettes. The authors concluded that this discrepancy indicated poor satisfaction with preoperative body image. This discrepancy was seen to decrease 1 year postoperatively. The BID score in the present study, 4.1±1.3 silhouettes, was very comparable to the BID

score observed by these researchers. Interestingly, the similarity of BID score reported by the bariatric surgery candidates in these studies was observed despite differences in the population evaluated, the type of bariatric surgery they were seeking, the healthcare environment the research was conducted in, and the sample size. These findings are consistent with the conclusion that LSG candidates in NL have impaired body image satisfaction before surgery. Two other studies in bariatric surgery populations also provide evidence to support this conclusion. Song and colleagues (2006) studied the body perception and satisfaction of body contouring surgery patients who had undergone bariatric surgery. Though this population was not specifically comparable to individuals seeking LSG in NL, the observation of dissatisfaction with body image in individuals seeking a body shape changing intervention is a similar feature. These researchers determined that body contouring surgery patients experienced body image dissatisfaction prior to surgery, and that this dissatisfaction was significantly improved after surgical intervention. Neven and associates (2002) also remarked the body image satisfaction was low before RYGB surgery, and that it improved after bariatric surgery intervention.

A review of the literature revealed that in studies evaluating body image dissatisfaction and disturbance using tools other than the SFRS, it has been consistently observed that body image disturbance exists before surgery, and improves after bariatric surgery. This observation has been consistent despite differences in the surgical populations assessed, the aspect of body image disturbance measured, survey instrument used, and study design. The results of prospective studies in this area suggest that the body image dissatisfaction of LSG candidates in NL may improve postoperatively.

Long-term follow-up and evaluation of body image expectation and dissatisfaction after surgery would be needed to test this hypothesis. Body image has been associated with poor mental health outcomes, poor psychosocial functioning, and eating disorders (Lau et al., 2007; McElroy et al., 2004; Sarwer et al., 2008; Wee et al., 2012).

In summary, almost half (49.4%) of extremely obese individuals seeking bariatric surgery underestimated their true body size on a figure rating scale. This finding may have implications for individual's self-perception of health risk status. Further evaluation of the health risk perception of individuals in relation to their current perceived body shape is warranted. Preoperative body image dissatisfaction was also observed in bariatric surgery candidates in NL. This finding is consistent with literature detailing the body image disturbance of bariatric surgery populations. Almost half of bariatric surgery candidates underestimated their true body size.

Chapter 6: Strengths and Limitations, Clinical Implications and Knowledge Translation, Future Research, and Conclusions

The purpose of this chapter is to summarize the strengths and limitations, clinical implications and knowledge translation, future research, and conclusions of this study. The first section includes a description and discussion of the strengths and limitations of this study. The second section outlines the clinical implications and active knowledge translation of the research findings. Topics within this section include changes in local clinical practice, knowledge translation activities, and planned future translational activities. The third section describes proposals for future research in this area. The final section includes a summary of the conclusions of this study.

6.1 Strengths and Limitations

This study had both strengths and limitations inherent in its design. This study was strengthened by several factors. The consecutive recruitment of study participants with a 100% response rate limited potential selection bias and indicated that a representative sample of LSG candidates in NL was most likely captured. A cross-sectional design was appropriate for this study, as it allowed for the rapid collection and analysis of preliminary, novel data to generate hypotheses for long-term future research. The sample size of the present analysis more than doubled that of the only other study to investigate the weight loss goals and expectations of bariatric surgery candidates in Canada (Karmali et al., 2010).

This research was limited by two biases inherent in cross-sectional study design. The self-report of survey items may have led to self-report bias, which is particularly important in relation to self-reported health and weight data. Reviews of the accuracy of height and weight data reveal that people tend to overestimate their height and underestimate their weight (Engstrom, Paterson, Doherty, Trabulsi, & Speer, 2003), although this method of data collection is still regularly used in the literature. Reports of weight may be conservative. If this were the case, the postoperative weight loss expectations observed herein would be even more divergent from clinically expected weight loss than was originally thought. Self-report bias may also have impacted the critical points of weight gain reported by candidates. It would be necessary to follow individuals over time to really assess when they gained weight in their lives. This bias may also have impacted the comorbidity data collected by self-report on the study questionnaire. However, research in the field of rheumatology and evaluation of chronic conditions has shown that a patient-reported questionnaire is a reproducible, reliable, and valid method of identifying existing comorbidity, which has practical and cost-saving advantages over traditional medical record abstraction methods (Katz, Chang, Sangha, Fossel, & Bates, 1996; Skinner, Miller, Lincoln, Lee, & Kazis, 2005). There may have been a social acceptability/ social desirability bias when candidates responded to survey items. Survey items inquiring about goal weight choice and the impact of current weight on life may have been influenced by social acceptability/ social desirability bias. Emphasizing to participants before they began the questionnaire that their responses would be totally anonymous and confidential minimized this potential source of bias. A final limitation was that BMI is an indirect surrogate measure of excess body weight

commonly used in clinical settings and epidemiological studies (WHO Consultation on Obesity, 2000). It is useful as a crude measure of population-level weight status and a reasonably reliable screening tool, as it correlates highly with direct measure of excess fat and health risk (Belle et al., 2007). However, the accuracy of BMI may vary on an individual level as it does not distinguish between fluid retention versus adiposity, cases of extreme height or muscle mass, ethnic differences on body composition, or the location of fat (WHO, 1995; Wellens, Roche & Khamis, 1996).

6.2 Clinical Implications and Knowledge Translation

The clinical implications of this research were identified, and where possible, translated into clinical practice as an ongoing part of this project. The present study was conducted as part of the Translational Research Program in Bariatric Care (TRPBC), a joint initiative of the Bariatric Surgery Clinic at Eastern Health and Memorial University of Newfoundland researchers from the Faculty of Medicine and School of Pharmacy. This partnership made it possible to interact with the multidisciplinary clinical care team, as well as other researchers and policy makers involved in bariatric care in NL, throughout the life of this project. The results of this study have been presented locally, nationally, and internationally, and more knowledge translation activities have been planned for the year ahead.

An active knowledge translation design resulted in changes to the bariatric surgery education program in NL. Study findings were disseminated to the TRPBC team via the formal presentation of study findings at a monthly NL BaSCo study meeting, monthly

reports detailing research progress, and one-on-one discussions with the bariatric Nurse practitioner and Dietician (Appendix C). One result of this active knowledge translation approach was the addition of a new section in the Bariatric Surgery General Orientation session emphasizing to patients what a realistic, evidence-based weight loss goal should be (45-60 %EWL). Attendance at one of these educational sessions is a mandatory component of patient flow through the Bariatric Care Clinic, so this education emphasizing realistic postoperative expectations from LSG will reach every adult seeking bariatric surgery in the province of NL. Research in the field of weight loss expectations has guided similar changes in the pre-surgical education Orientation Sessions associated with the Weight Wise program in Alberta (Sharma, 2008). The aim of the program changes in this province was also to temper patients' unrealistic expectations of how much weight they can lose and keep off after bariatric surgery. A second result of active knowledge translation is that realistic weight loss expectations and successful weight loss outcomes are now calculated by the bariatric Nurse practitioner for each bariatric surgery candidate in NL at their one-on-one consultation appointment (Personal communication, March 13th, 2012). Translational activities have also precipitated a more in-depth analysis of the interview material from the qualitative arm of the NL BaSCo study to investigate root causes of weight gain as well as the weight loss expectations of candidates before surgery.

The knowledge gained from this study was translated at local, national, and international levels (Appendix C). Research findings were disseminated on the local level via presentations to the TRPBC team, Clinical Epidemiology Seminar Series, NLCAHR Research Exchange Group on Women's Health/ Gender and Health, and

Faculty of Medicine's Memorial University Reunion 2012. Study findings were presented nationally at the Canadian Obesity Student Meeting 2012 in Edmonton, Alberta, and in partnership with qualitative research findings at the Advancing Excellence in Gender, Sex, and Health Research conference hosted by the Institute of Gender and Health in Montréal, Québec. Finally, this research was disseminated at the international level at the Obesity 2012- 30th Annual Scientific Meeting in San Antonio, Texas.

Planned future translational activities include the publication of research findings, final presentations, and a proposal for ways to develop more comprehensive pre-surgical education program materials. Manuscripts are now being prepared for publication and will be submitted to relevant research journals for peer review in the winter of 2013. Final presentations of research findings are anticipated for the TRPBC team, the Faculty of Medicine's annual Clinical Epidemiology Research Day, the 2013 Canadian Society of Epidemiology and Biostatistics student conference, the CIHR Research Planning Meeting for the NL BaSCo study, and to the Bariatric Surgery Patient Support Group NL and the Bariatric Surgery Multi-Disciplinary Care Team at Eastern Health as well as via a newsletter to bariatric surgery patients. This study is a component of the TRPBC program who's ultimate goals are to improve quality of care and health services delivery and ultimately to reduce the burden of obesity and improve population health.

The development of educational tools to increase the awareness of realistic postoperative weight loss and body shape expectations will be proposed. These might include the creation of a new visual aid using silhouettes to depict the range of clinically expected body shapes from LSG, and an LSG surgery information website. Effort will be made to engage researchers and policy makers to continue to work together and secure

funding for the development of additional educational resources for bariatric surgery candidates in NL.

In summary, the present study included the unique opportunity to translate research findings directly from the researcher to the healthcare providers to have a direct and immediate impact on patient care. Bariatric surgery education in NL now emphasizes clinically expected weight loss expectations and body shape expectations based on clinically defined surgical success attributed to translational research efforts throughout the life of this study. The findings of this study have been translated on the local, national, and international levels, and efforts will continue to be put forward translate these study findings.

6.3 Future Research

Future research in the field of weight loss and body shape expectations will be increasingly important and relevant as both the prevalence of obesity and the popularity of bariatric surgery intervention continue to rise. More long-term studies are needed to determine the impact of preoperative weight loss expectations on weight outcomes over time. Observational studies designed to determine the impact of unrealistic weight loss expectations on postoperative weight loss outcomes should be pursued. Body shape expectations and realistic postoperative body shapes should also be examined as a part of a long-term prospective analysis of the impact of expectations on outcomes. Randomized controlled trials should be designed to evaluate the effectiveness of educational intervention on weight loss expectations. Body misperception and its association with health risk awareness and goal weight choice presents another direction for research that

should be explored in a larger sample size. All of these future avenues of research should continue to benefit from active knowledge translation activities.

6.4 Conclusions

Bariatric surgery candidates report that illness or injury, childhood, and pregnancy were critical periods of weight gain in their lives. Individuals seeking bariatric surgery are very dissatisfied with their current weight, which negatively impacts physical, social, and psychological aspects of their lives. Bariatric surgery candidates report that health related reasons are the most significant motivation for selecting a weight loss goal, while social related factors have very little influence on this decision.

There is a disconnect between the weight loss expectations of bariatric surgery candidates in NL and what can be clinically expected from LSG surgery. Body shape expectations do not correspond with evidence-based weight loss outcomes from LSG surgery. LSG candidates in NL experience preoperative body image dissatisfaction and misperceive their true body size.

REFERENCES

1983 metropolitan height and weight tables. (1983). *Stat Bull Metrop Life Found, 64*(1), 3-9.

Adami, G. F., Meneghelli, A., Bressani, A., & Scopinaro, N. (1999). Body image in obese patients before and after stable weight reduction following bariatric surgery. *J Psychosom Res, 46*(3), 275-281.

Ames, G. E., Perri, M. G., Fox, L. D., Fallon, E. A., De Braganza, N., Murawski, M. E., et al. (2005). Changing weight-loss expectations: a randomized pilot study. *Eat Behav, 6*(3), 259-269.

Anderson, D. A., Lundgren, J. D., Shapiro, J. R., & Paulosky, C. A. (2003). Weight goals in a college-age population. *Obes Res, 11*(2), 274-278.

Anvari, M. (2007). Is type 2 diabetes a surgical disease? *Can J Surg, 50*(4), 249-250.

Ashwell, M. (2011). Charts Based on Body Mass Index and Waist-to-Height Ratio to Assess the Health Risks of Obesity. *The Open Obesity Journal, 3*, 78-84.

Bays, H. E., Bazata, D. D., Fox, K. M., Grandy, S., & Gavin, J. R., 3rd. (2009). Perceived body image in men and women with type 2 diabetes mellitus: correlation of body mass index with the figure rating scale. *Nutr J, 8*, 57.

Belle, S. H., Berk, P. D., Courcoulas, A. P., Flum, D. R., Miles, C. W., Mitchell, J. E., et al. (2007). Safety and efficacy of bariatric surgery: Longitudinal Assessment of Bariatric Surgery. *Surg Obes Relat Dis, 3*(2), 116-126.

Benkeser, R. M., Biritwum, R., & Hill, A. G. (2012). Prevalence of overweight and obesity and perception of healthy and desirable body size in urban, Ghanaian women. *Ghana Med J, 46*(2), 66-75.

Bero, L. A., Grilli, R., Grimshaw, J. M., Harvey, E., Oxman, A. D., & Thomson, M. A. (1998). Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. The Cochrane Effective Practice and Organization of Care Review Group. *BMJ, 317*(7156), 465-468.

Bray, G. A., & Champagne, C. M. (2005). Beyond energy balance: there is more to obesity than kilocalories. *J Am Diet Assoc, 105*(5 Suppl 1), S17-23.

Brownell, K. D., & Wadden, T. A. (1991). The Heterogeneity of Obesity: Fitting Treatments to Individuals. *Behavior Therapy, 22*, 153-177.

Buchwald, H., & Oien, D. M. (2009). Metabolic/bariatric surgery Worldwide 2008. *Obes Surg, 19*(12), 1605-1611.

Bulik, C. M., Wade, T. D., Heath, A. C., Martin, N. G., Stunkard, A. J., & Eaves, L. J. (2001). Relating body mass index to figural stimuli: population-based normative data for Caucasians. *Int J Obes Relat Metab Disord, 25*(10), 1517-1524.

Byrne, S. M. (2002). Psychological aspects of weight maintenance and relapse in obesity. *J Psychosom Res, 53*(5), 1029-1036.

Calle, E. E., Thun, M. J., Petrelli, J. M., Rodriguez, C., & Heath, C. W., Jr. (1999). Body-mass index and mortality in a prospective cohort of U.S. adults. *N Engl J Med, 341*(15), 1097-1105.

Can, A. S. (2011). Body Mass Index, Waist-to-Height Ratio, Cardiometabolic Risk Factors and Diseases in a New Obesity Classification Proposal. *The Open Obesity Journal, 3*, 56-61.

Canadian Agency for Drugs and Technology in Health. (2010). Laparoscopic Sleeve Gastrectomy: A Review of the Clinical Benefits and Harms. *Health Technology Inquiry Service*.

Carter-Edwards, L., Bastian, L. A., Revels, J., Durham, H., Lokhnygina, Y., Amamoo, M. A., et al. (2010). Body image and body satisfaction differ by race in overweight postpartum mothers. *J Womens Health (Larchmt), 19*(2), 305-311.

Cooper, Z., & Fairburn, C. G. (2001). A new cognitive behavioural approach to the treatment of obesity. *Behav Res Ther, 39*(5), 499-511.

Crawford, R., & Glover, L. (2012). The impact of pre-treatment weight-loss expectations on weight loss, weight regain, and attrition in people who are overweight and obese: a systematic review of the literature. *Br J Health Psychol, 17*(3), 609-630.

Dalle Grave, R., Calugi, S., Molinari, E., Petroni, M. L., Bondi, M., Compare, A., et al. (2005). Weight Loss Expectations in Obese Patients and Treatment Attrition: An Observational Multicenter Study[ast][ast]. *Obesity, 13*(11), 1961-1969.

De Panfilis, C., Cero, S., Torre, M., Salvatore, P., Dall'Aglio, E., Adorni, A., et al. (2007). Changes in body image disturbance in morbidly obese patients 1 year after laparoscopic adjustable gastric banding. *Obes Surg, 17*(6), 792-799.

Deeks, A., Lombard, C., Michelmore, J., & Teede, H. (2009). The effects of gender and age on health related behaviors. *BMC Public Health, 9*, 213.

Dixon, J. B., Dixon, M. E., & O'Brien, P. E. (2002). Body image: appearance orientation and evaluation in the severely obese. Changes with weight loss. *Obes Surg, 12*(1), 65-71.

Dutton, G. R., Perri, M. G., Dancer-Brown, M., Goble, M., & Van Vessem, N. (2010). Weight loss goals of patients in a health maintenance organization. *Eat Behav, 11*(2), 74-78.

Engstrom, J. L., Paterson, S. A., Doherty, A., Trabulsi, M., & Speer, K. L. (2003). Accuracy of self-reported height and weight in women: an integrative review of the literature. *J Midwifery Womens Health, 48*(5), 338-345.

Fallon, A. E., & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology, 94*(1), 102-105.

Fabricatore, A. N., Wadden, T. A., Rohay, J. M., Pillitteri, J. L., Shiffman, S., Harkins, A. M., et al. (2008). Weight loss expectations and goals in a population sample of overweight and obese US adults. *Obesity (Silver Spring), 16*(11), 2445-2450.

Foster, G. D., Wadden, T. A., Phelan, S., Sarwer, D. B., & Sanderson, R. S. (2001). Obese patients' perceptions of treatment outcomes and the factors that influence them. *Arch Intern Med, 161*(17), 2133-2139.

Foster, G. D., Wadden, T. A., Vogt, R. A., & Brewer, G. (1997). What is a reasonable weight loss? Patients' expectations and evaluations of obesity treatment outcomes. *J Consult Clin Psychol, 65*(1), 79-85.

Gilbert-Diamond, D., Baylin, A., Mora-Plazas, M., & Villamor, E. (2009). Correlates of Obesity and Body Image in Colombian Women. *Journal of Women's Health (15409996), 18*(8), 1145-1151.

Heinberg, L. J., Keating, K., & Simonelli, L. (2009). Discrepancy between ideal and realistic goal weights in three bariatric procedures: who is likely to be unrealistic? *Obes Surg, 20*(2), 148-153.

Hill, J., Catenacci, Y., & Wyatt, H. (2006). *Obesity. Etiology in Modern Nutrition in Health and Disease*: Lippincott Williams & Wilkins.

Hrabosky, J. I., Masheb, R. M., White, M. A., Rothschild, B. S., Burke-Martindale, C. H., & Grilo, C. M. (2006). A prospective study of body dissatisfaction and concerns in extremely obese gastric bypass patients: 6- and 12-month postoperative outcomes. *Obes Surg, 16*(12), 1615-1621.

Jeffery, R. W., Wing, R. R., & Mayer, R. R. (1998). Are smaller weight losses or more achievable weight loss goals better in the long term for obese patients? *J Consult Clin Psychol, 66*(4), 641-645.

Kaly, P., Orellana, S., Torrella, T., Takagishi, C., Saff-Koche, L., & Murr, M. M. (2008). Unrealistic weight loss expectations in candidates for bariatric surgery. *Surg Obes Relat Dis, 4*(1), 6-10.

Karmali, S., Kadikoy, H., Brandt, M. L., & Sherman, V. (2010). What is my goal? Expected weight loss and comorbidity outcomes among bariatric surgery patients. *Obes Surg, 21*(5), 595-603.

Katz, J. N., Chang, L. C., Sangha, O., Fossel, A. H., & Bates, D. W. (1996). Can comorbidity be measured by questionnaire rather than medical record review? *Med Care, 34*(1), 73-84.

Kincey, J. (1980). Target setting, self-reinforcement pattern and locus of control orientation as predictors of outcome in a behavioural weight-loss programme. *Behav Res Ther, 18*(2), 139-145.

Kolotkin, R. L., Crosby, R. D., Pendleton, R., Strong, M., Gress, R. E., & Adams, T. (2003). Health-related quality of life in patients seeking gastric bypass surgery vs non-treatment-seeking controls. *Obes Surg, 13*(3), 371-377.

Koprowski, C., Coates, R. J., & Bernstein, L. (2001). Ability of young women to recall past body size and age at menarche. *Obes Res, 9*(8), 478-485.

Lau, D. C., Douketis, J. D., Morrison, K. M., Hramiak, I. M., Sharma, A. M., & Ur, E. (2007). 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [summary]. *CMAJ, 176*(8), S1-13.

Libeton, M., Dixon, J. B., Laurie, C., & O'Brien, P. E. (2004). Patient motivation for bariatric surgery: characteristics and impact on outcomes. *Obes Surg, 14*(3), 392-398.

Linde, J. A., Jeffery, R. W., Finch, E. A., Ng, D. M., & Rothman, A. J. (2004). Are unrealistic weight loss goals associated with outcomes for overweight women? *Obes Res, 12*(3), 569-576.

Linde, J. A., Jeffery, R. W., Levy, R. L., Pronk, N. P., & Boyle, R. G. (2005). Weight loss goals and treatment outcomes among overweight men and women enrolled in a weight loss trial. *Int J Obes (Lond), 29*(8), 1002-1005.

Loveman, E., Frampton, G. K., Shepherd, J., Picot, J., Cooper, K., Bryant, J., et al. (2011). The clinical effectiveness and cost-effectiveness of long-term weight management schemes for adults: a systematic review. *Health Technol Assess, 15*(2), 1-182.

Madan, A. K., Beech, B. M., & Tichansky, D. S. (2008). Body esteem improves after bariatric surgery. *Surg Innov, 15*(1), 32-37.

Malhi, G. S., & Mitchell, P. B. (2003). Pharmacotherapy to limit weight gain caused by antipsychotic use. *Expert Opin Pharmacother, 4*(10), 1679-1686.

Masheb, R. M., & Grilo, C. M. (2002). Weight loss expectations in patients with binge-eating disorder. *Obes Res, 10*(5), 309-314.

Masheb, R. M., Grilo, C. M., Burke-Martindale, C. H., & Rothschild, B. S. (2006). Evaluating oneself by shape and weight is not the same as being dissatisfied about shape and weight: A longitudinal examination in severely obese gastric bypass patients. *International Journal of Eating Disorders, 39*(8), 716-720.

McElroy, S. L., Kotwal, R., Malhotra, S., Nelson, E. B., Keck, P. E., & Nemeroff, C. B. (2004). Are mood disorders and obesity related? A review for the mental health professional. *J Clin Psychiatry, 65*(5), 634-651, quiz 730.

Montero, P. N., Stefanidis, D., Norton, H. J., Gersin, K., & Kuwada, T. (2010). Reported excess weight loss after bariatric surgery could vary significantly depending on calculation method: a plea for standardization. *Surg Obes Relat Dis, 7*(4), 531-534.

Munger, K. L., Chitnis, T., & Ascherio, A. (2009). Body size and risk of MS in two cohorts of US women. *Neurology, 73*(19), 1543-1550.

Munoz, D., Chen, E. Y., Fischer, S., Sanchez-Johnsen, L., Roherig, M., Dymek-Valentine, M., et al. (2010). Changes in desired body shape after bariatric surgery. *Eat Disord, 18*(4), 347-354.

Munro, B. H. (2001). *Statistical methods for health care researchers* (4 ed.). Philadelphia: Lippincott.

Napolitano, D. A., Zarcone, J., Nielsen, S., Wang, H., & Caliendo, J. M. (2009). Perceptions of body image by persons with Prader-Willi syndrome and their parents. *Am J Intellect Dev Disabil, 115*(1), 43-53.

Neven, K., Dymek, M., leGrange, D., Maasdam, H., Boogerd, A. C., & Alverdy, J. (2002). The effects of Roux-en-Y gastric bypass surgery on body image. *Obes Surg, 12*(2), 265-269.

Orpana, H. M., Berthelot, J.-M., Kaplan, M. S., Feeny, D. H., McFarland, B., & Ross, N. A. (2009). BMI and Mortality: Results From a National Longitudinal Study of Canadian Adults. *Obesity, 18*(1), 214-218.

Padwal, R., Klarenbach, S., Wiebe, N., Hazel, M., Birch, D., Karmali, S., et al. (2011). Bariatric surgery: a systematic review of the clinical and economic evidence. *J Gen Intern Med, 26*(10), 1183-1194.

Padwal, R. S., Chang, H. J., Klarenbach, S., Sharma, A. M., & Majumdar, S. R. (2012). Characteristics of the population eligible for and receiving publicly funded bariatric surgery in Canada. *Int J Equity Health, 11*, 54.

Picot, J., Jones, J., Colquitt, J. L., Gospodarevskaya, E., Loveman, E., Baxter, L., et al. (2009). The clinical effectiveness and cost-effectiveness of bariatric (weight loss) surgery for obesity: a systematic review and economic evaluation. *Health Technol Assess, 13*(41), 1-190, 215-357, iii-iv.

Pingitore, R., Spring, B., & Garfield, D. (1997). Gender differences in body satisfaction. *Obes Res, 5*(5), 402-409.

Prochaska, J. O., DiClemente, C. C., & Norcross, J. C. (1992). In search of how people change. Applications to addictive behaviors. *Am Psychol, 47*(9), 1102-1114.

Provencher, V., Bégin, C., Gagnon-Girouard, M. P., Gagnon, H. C., Tremblay, A., Boivin, S., et al. (2007). Defined weight expectations in overweight women: anthropometrical, psychological and eating behavioral correlates. *Int J Obes (Lond), 31*(11), 1731-1738.

Rothman, A. J. (2000). Toward a theory-based analysis of behavioral maintenance. *Health Psychol, 19*(1 Suppl), 64-69.

Sarwer, D. B., Fabricatore, A. N., Eisenberg, M. H., Sywulak, L. A., & Wadden, T. A. (2008). Self-reported stigmatization among candidates for bariatric surgery. *Obesity (Silver Spring), 16 Suppl 2*, S75-79.

Sarwer, D. B., Lavery, M., & Spitzer, J. C. (2012). A review of the relationships between extreme obesity, quality of life, and sexual function. *Obes Surg, 22*(4), 668-676.

Schilder, P. F. (1935). *The Image and Appearance of the Human Body: Studies in the Constructive Energies of the Psyche*. New York: International Universities Press.

Sharma, A. M. (2008). Unrealistic Weight-Loss Expectations Guarantee Disappointment. Retrieved December 15th, 2012, from http://www.drsharma.ca/unrealistic-weight-loss-expectations-guarantee-disappointment.html

Sharma, A. M., & Padwal, R. (2009). Obesity is a sign - over-eating is a symptom: an aetiological framework for the assessment and management of obesity. *Obes Rev, 11*(5), 362-370.

Shields, M., & Tjepkema, M. (2006). Regional differences in obesity. *Health Rep, 17*(3), 61-67.

Silva, M. N., Markland, D., Minderico, C. S., Vieira, P. N., Castro, M. M., Coutinho, S. R., et al. (2008). A randomized controlled trial to evaluate self-determination theory for exercise adherence and weight control: rationale and intervention description. *BMC Public Health, 8*, 234.

Sjöström, L., Narbro, K., Sjöström, C. D., Karason, K., Larsson, B., Wedel, H., et al. (2007). Effects of bariatric surgery on mortality in Swedish obese subjects. *N Engl J Med, 357*(8), 741-752.

Skinner, K. M., Miller, D. R., Lincoln, E., Lee, A., & Kazis, L. E. (2005). Concordance between respondent self-reports and medical records for chronic conditions: experience from the Veterans Health Study. *J Ambul Care Manage, 28*(2), 102-110.

Snyder, R. (1997). Self-discrepancy theory, standards for body evaluation, and eating disorder symptomatology among college women. *Women Health, 26*(2), 69-84.

Song, A. Y., Rubin, J. P., Thomas, V., Dudas, J. R., Marra, K. G., & Fernstrom, M. H. (2006). Body image and quality of life in post massive weight loss body contouring patients. *Obesity (Silver Spring), 14*(9), 1626-1636.

Sorbara, M., & Geliebter, A. (2002). Body image disturbance in obese outpatients before and after weight loss in relation to race, gender, binge eating, and age of onset of obesity. *Int J Eat Disord, 31*(4), 416-423.

Statistics Canada. (2012). Body mass index, overweight or obese, self-reported, adult, by sex, provinces and territories [Data Set]. Retrieved August 6, 2012, from http://www40.statcan.ca/l01/cst01/health82a-eng.htm

Stefater, M. A., Wilson-Pérez, H. E., Chambers, A. P., Sandoval, D. A., & Seeley, R. J. (2012). All bariatric surgeries are not created equal: insights from mechanistic comparisons. *Endocr Rev, 33*(4), 595-622.

Stevens, G. A., Singh, G. M., Lu, Y., Danaei, G., Lin, J. K., Finucane, M. M., et al. (2012). National, regional, and global trends in adult overweight and obesity prevalences. *Popul Health Metr, 10*(1), 22.

Stunkard, A. J., Sørensen, T., & Schulsinger, F. (1983). Use of the Danish Adoption Register for the study of obesity and thinness. *Res Publ Assoc Res Nerv Ment Dis, 60*, 115-120.

Stunkard, A. J., & Allison, K. C. (2003). Binge eating disorder: disorder or marker? *Int J Eat Disord, 34 Suppl*, S107-116.

Teixeira, P. J., Going, S. B., Houtkooper, L. B., Cussler, E. C., Martin, C. J., Metcalfe, L. L., et al. (2002). Weight loss readiness in middle-aged women: psychosocial predictors of success for behavioral weight reduction. *J Behav Med, 25*(6), 499-523.

Teixeira, P. J., Palmeira, A. L., Branco, T. L., Martins, S. S., Minderico, C. S., Barata, J. T., et al. (2004). Who will lose weight? A reexamination of predictors of weight loss in women. *Int J Behav Nutr Phys Act, 1*(1), 12.

Thompson, J. K. M. N. (1991). Psychometric Qualities of the Figure Rating Scale. *International Journal of Eating Disorders, 10*(5), 615-619.

Teufel, M., Rieber, N., Meile, T., Giel, K. E., Sauer, H., Hünnemeyer, K., et al. (2012). Body image after sleeve gastrectomy: reduced dissatisfaction and increased dynamics. *Obes Surg, 22*(8), 1232-1237.

Twells, L. K. (2010). *Obesity and its Impact on a Provincial Health System in Canada.* Memorial University, St. John's.

Valtolina, G. G. (1998). Body-size estimation by obese subjects. *Percept Mot Skills, 86*(3 Pt 2), 1363-1374.

van Hout, G. C., Fortuin, F. A., Pelle, A. J., & van Heck, G. L. (2008). Psychosocial functioning, personality, and body image following vertical banded gastroplasty. *Obes Surg, 18*(1), 115-120.

Victorzon, M. (2012). An update on sleeve gastrectomy. *Minerva Chir, 67*(2), 153-163.

Wadden, T. A., Womble, L. G., Sarwer, D. B., Berkowitz, R. I., Clark, V. L., & Foster, G. D. (2003). Great expectations: "I'm losing 25% of my weight no matter what you say". *J Consult Clin Psychol, 71*(6), 1084-1089.

Walfish, S., Vance, D., & Fabricatore, A. N. (2007). Psychological evaluation of bariatric surgery applicants: procedures and reasons for delay or denial of surgery. *Obes Surg, 17*(12), 1578-1583.

Wamsteker, E. W., Geenen, R., Zelissen, P. M., van Furth, E. F., & Iestra, J. (2009). Unrealistic weight-loss goals among obese patients are associated with age and causal attributions. *J Am Diet Assoc, 109*(11), 1903-1908.

Wee, C. C., Davis, R. B., Huskey, K. W., Jones, D. B., & Hamel, M. B. (2012). Quality of Life Among Obese Patients Seeking Weight Loss Surgery: The Importance of Obesity-Related Social Stigma and Functional Status. *J Gen Intern Med.*

Wellens R. Roche A, Khamis H et al. Relationships between the body mass index and body composition. *Obes Res* 1996;4(1):35-44

White, M. A., Masheb, R. M., Rothschild, B. S., Burke-Martindale, C. H., & Grilo, C. M. (2007). Do patients' unrealistic weight goals have prognostic significance for bariatric surgery? *Obes Surg, 17*(1), 74-81.

WHO. (2012a). Country Comparison Graph (Publication, from World Health Organization: http://apps.who.int/bmi/index.jsp)

WHO. (2012b). Country Comparison Table (Publication, from World Health Organization: www.who.int/bmi/index.jsp)

WHO Consultation on Obesity. (2000). Obesity: preventing and managing the global epidemic. Report of a WHO consultation. *World Health Organ Tech Rep Ser, 894*, i-xii, 1-253.

WHO Physical Status: The Use and Interpretation of Anthropometry. Technical Report Series 854. Geneva Switzerland: World Health Organization; 1995

Williamson, D. A., Gleaves, D. H., Watkins, P. C., & Schlundt, D. G. (1993). Validation of self-ideal body size discrepancy as a measure of body dissatisfaction. *Journal of Psychopathology and Behavioral Assessment, 15*(1), 57-68.

APPENDIX A: Ethical Approval

MEMORIAL

Human Investigation Committee
Suite 200, 2nd Floor Bonaventure Place
35 Bonaventure Avenue
St. John's, NL Canada A1B 2X5
Tel: 709 777 6974 Fax: 709 777 8776
hic@mun.ca www.med.mun.ca/hic

May 31, 2011

Dr. Laurie Twells
C/o Kim Manning
School of Pharmacy

Dear Dr. Twells:

Reference #11.087

Re: Impact of waiting for bariatric surgery on patients' perceived quality of life: factors and consequences

Your application received an expedited review by a Sub-Committee of the Human Investigation Committee and **full approval** was granted effective **May 27, 2011.**

This approval will lapse on **May 26, 2012**. It is your responsibility to ensure that the Ethics Renewal form is forwarded to the HIC office prior to the renewal date. *The information provided in this form must be **current to the time of submission** and submitted to the HIC **not less than 30 nor more than 45 days** of the anniversary of your approval date.* The Ethics Renewal form can be downloaded from the HIC website http://www.med.mun.ca/hic/downloads/Annual%20Update%20Form.doc

This is to confirm that the following documents have been reviewed and approved or acknowledged (as indicated):

- The application, approved
- Response to questions 1-4, approved
- Introductory Letter to Bariatric Surgeon, approved
- Introductory Letter to Potential Participants about Research Study, approved
- Questionnaires, approved
- Budget, acknowledged

The Human Investigation Committee advises THAT IF YOU DO NOT return the completed Ethics Renewal form prior to date of renewal:

- *Your ethics approval will lapse*
- *You will be required to stop research activity immediately*
- *You may not be permitted to restart the study until you reapply for and receive approval to undertake the study again*

Lapse in ethics approval may result in interruption or termination of funding

It is your responsibility to seek the necessary approval from Eastern Health, other hospital boards and/or organizations as appropriate.

Modifications of the protocol/consent are not permitted without prior approval from the Human Investigation Committee. Implementing changes in the protocol/consent without HIC approval may result in the approval of your research study being revoked, necessitating cessation of all related research activity. Request for modification to the protocol/consent must be outlined on an amendment form (available on the HIC website) and submitted to the HIC for review.
This research ethics board (the HIC) has reviewed and approved the research protocol and documentation as noted above for the study which is to be conducted by you as the qualified investigator named above at the specified site. This approval and the views of this Research Ethics Board have been documented in writing. In addition, please be advised that the Human Investigation Committee currently operates according to *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*; *ICH Guidance E6: Good Clinical Practice* and applicable laws and regulations. The membership of this research ethics board is constituted in compliance with the membership requirements for research ethics boards as defined by *Health Canada Food and Drug Regulations Division 5; Part C*

Notwithstanding the approval of the HIC, the primary responsibility for the ethical conduct of the investigation remains with you.

We wish you every success with your study.

Sincerely,

Dr. F Brunger, PhD
Dr. M. Khraishi, MB, B.Ch., FRCPC
Co-Chairs
Human Investigation Committee

C VP Research c/o Office of Research, MUN
VP Research c/o Patient Research Centre, Eastern Health
HIC meeting date: June 9, 2011

Health Research Ethics Authority

Ethics Office
Suite 200, Eastern Trust Building
95 Bonaventure Avenue
St. John's, NL
A1B 2X5

October 12, 2011

Dr. Laurie Twells
C/o Kim Manning
School of Pharmacy

Dear Dr. Twells:

Reference #11.087

Re: Impact of waiting for bariatric surgery on patients' perceived quality of life: factors and consequences

This will acknowledge receipt of the correspondence dated **October 7, 2011** wherein you request an amendment to the above noted research.

The co-chair of the Health Research Ethics Board has reviewed your correspondence and has approved:

1. The amendment dated October 7, 2011 Version #1
2. Goals and Expectations Questionnaire
3. Questions to be added to the GRWQ Part II in each weight category section

It is **your responsibility to seek the necessary approval from the Regional Health Authority or other organization as appropriate**.

This Research Ethics Board (the HREB) has reviewed the amendment for the study which is to be conducted by you as the qualified investigator named above at the specified study site. This approval and the views of this Research Ethics Board have been documented in writing. In addition, please be advised that the Health Research Ethics Board currently operates according to the Tri-Council Policy Statement and applicable laws and regulations.

email: info@hrea.ca Phone: 777-8949 FAX: 777-8776

Sincerely,

Patricia Grainger, Acting Chair
Health Research Ethics Board

Notification to: VP Research c/o Office of Research, MUN
VP Research c/o Patient Research Centre, Eastern Health

For office use only: October 20, 2011

Health Research Ethics Authority

RECEIVED APR 2 5 2012

Request For Ethics Renewal / Study Closure

- **The Tri-Council Policy Statement- Ethical Conduct for Research Involving Humans (TCPS2; 2010) (article 6.14) requires ongoing review by the approving REB at least on an annual basis. The information provided in this form must be current to the time of submission and submitted to the HREA not less than 30 days nor more than 45 days before the anniversary of your approval date.**
- **Ethics approval is required If there is ongoing subject contact or data collection/transfer is active.**
- **Ethics approval is not required and the file may be closed If the project is in analysis or the writing stage.**
- **Please forward a summary of findings or published abstract to the HREA Office once the study is complete.**
- **Incomplete forms will not be accepted and may result in delay in the review and approval process**
- **(For clinical trials only) If the project is complete – please submit the applicable Study Closure form.**

HREB Ref Number: 11.087	**Expiry Date of Current Approval** 05/26/2012
Principal Investigator: Dr. Laurie Twells	
Title of study (with Protocol Number if applicable): **"Impact of waiting for bariatric surgery on patients' perceived quality of life: factors and consequences"**	
Email of PI : ltwells@mun.ca	**Email of Key Contact: Kimberley.manning@easternhealth.ca**

Please chose one:		
OR	***I am requesting renewal of ethics approval for this file.***	
	I am requesting to close this file.	X

Dr. Laurie Twells — Name typed or printed

Twells — Signature of PI

04/24/2012 — Date (MM/DD/YYY)

For HREB Office Use Only:

This project was reviewed on April 30, 2012 *Date* ***By Full Board Review*** ☐ ***By Expedited Review*** ☒

Ethics approval for this project has been granted for a period of 12 months effective ***From*** _____

to _____

This research ethics board (the HREB) has reviewed and approved the study which is to be conducted by you as the qualified investigator/principal investigator named above. This approval and the views of this Research Ethics Board have been documented in writing. The Health Research Ethics Board operates according to *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, ICH Guidance E6: Good Clinical Practice: Consolidated guideline* and applicable laws and regulations. The membership of this research ethics board is constituted in compliance with the membership requirements for research ethics boards as defined by Health Canada Food and Drug Regulations Division 5; Part C.

This file has been closed as requested ☑

Patricia Lannigan — *Signature Chair*

APPROVED APR 3 0 2012 — *Date*

Recruitment/Data Collection

Has the study started?	Yes	No
	X	

If yes, please provide the following information as it applies to your project.

	Total planned for this site	Total to date *(if applicable)*	N/A
A. Number of Participants enrolled			X
B. Number of Health Records reviewed			X
C. Number of tissue samples collected			X
D. Number of surveys returned		84	

If more or fewer than expected, why?

Consent Form

Does this project have a consent form?	Yes	No
		X

If yes, Please give the date of the most recently approved consent form			

For Clinical Trials Only *which are subject to ICH & Health Canada and required to report SAEs and SUSAR's to the REB*
Serious Adverse Event/s (SAE's) Or Suspected Unexpected Serious Adverse Reactions (SUSARS)

1. **Since Last Approval** a. Have DSMB/ QSR reports been submitted to HREA ?	**Yes**	**No**
2. **Since Last Approval** **a.** Has there been amendments to this protocol as a result of safety reports ? *If yes, please provide a list amendment dates*	**Yes**	**No**
3. **Since Last Approval** a. Have you reported local SAE's? b. **If yes**, please provide number of **local** events: _____	**Yes**	**No**
4. **Since Last Approval** a. Have you reported deviations to the sponsor? b. **If yes**, please provide number of **Deviations:** _____	**Yes**	**No**
5. **Since Last Approval** a. Have you requested waivers? b. **If yes**, please provide number of **waivers**: _____	**Yes**	**No**

All Other Studies: Since Last Approval				
1. Have there been unexpected events or problems related to participant risk since original approval or last ethics renewal?	**Yes**		**No**	X
2. Has there been amendments submitted for this project? Amendment approved October 07, 2011 for the addition of the Goals and Expectations questionnaire.	**Yes**	X	**No**	
If yes, please describe the events/problems/amendments : (Add an addendum to this form if necessary)				

All Studies - Status At Local Site (check all that apply)	YES	NO	N/A
1. Intervention/data collection active		X	
2. Closed to recruitment/accrual	X		
3. Participants in follow up			X
4. Site closed [clinical trials only]			X
5. **For secondary use of date only** is Data Transfer Complete			X

Knowledge Transfer	YES	NO	N/A
1. Have participants been informed of study findings?		X	
2. Have findings been presented/published? *Please Indicate where: (Add an addendum to this form if necessary)*		X	

Additional Information :

APPENDIX B: Study Questionnaire

Demographic Information

Please complete the following questions by checking the appropriate response or filling in the blank.

1. Date of birth: _____/_____/_____
   DD / MM / YYYY

2. Sex
   ( ) Male ( ) Female

3. Height: _____ feet _____ inches

4. Current marital status:
   ( ) Married/ Common Law
   ( ) Widowed
   ( ) Separated/ Divorced
   ( ) Single/ Never Married

5. Current highest level of education:
   ( ) No high school
   ( ) Some high school
   ( ) High school diploma
   ( ) Some post-secondary
   ( ) Completed post-secondary

6. Current employment status:
   ( ) Employed full-time
   ( ) Employed part-time
   ( ) Employed casual/ volunteer
   ( ) Homemaker full time
   ( ) Unemployed
   ( ) On short-term disability
   ( ) On long-term disability
   ( ) Retired
   ( ) Other
   Please specify_____.

7. Medical history. Have you ever been *diagnosed by a doctor* with any of the following conditions? Please check as many as applicable.

   ( ) Type 2 Diabetes
   ( ) Type 1 Diabetes
   ( ) Diabetes during pregnancy only
   ( ) Hypertension
   ( ) Osteoarthritis
   ( ) Sleep apnea
   ( ) Cardiovascular disease
   ( ) High Cholesterol
   ( ) Asthma
   ( ) Depression
   ( ) Urinary incontinence
   ( ) Reflux
   ( ) Infertility
   ( ) Other
   Please specify_____.

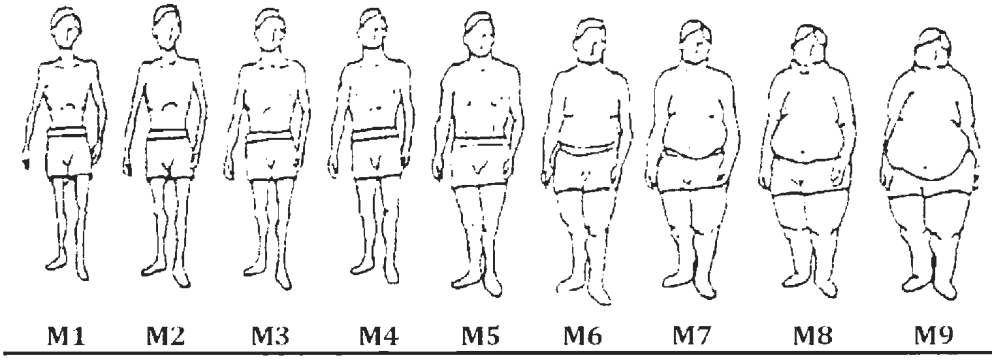
Goals and Expectations Questionnaire

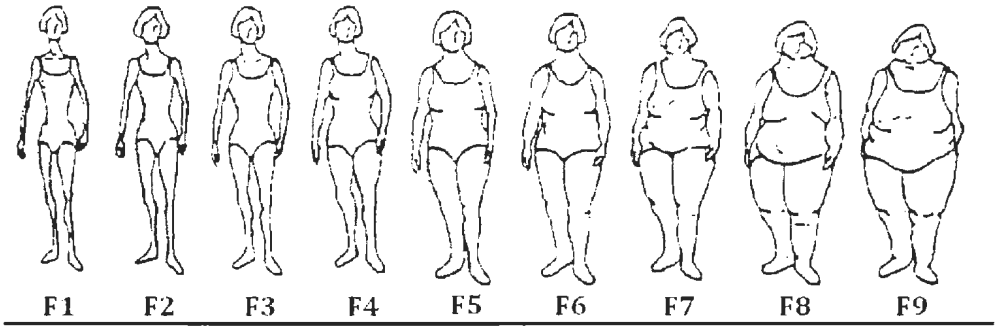
This questionnaire is designed to learn more about what factors are important to people when setting a weight loss goal.

Part I

1. What is your **goal weight**? _____ lbs

   a. Circle your goal weight figure.





b. Please indicate how important each of the following factors are in deciding upon your goal weight?

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
not at all important				*somewhat important*					***very important***

a._____ Appearance

b._____ Clothes size

c._____ Change in medical conditions

d._____ A weight that you were at some significant time in your life (ex. marriage, before you had children, etc.)

e._____ A weight that you reached after a previous weight loss effort

f._____ Social acceptance

g._____ Ideal weight from chart or weight based on height

h._____ Weight suggested by doctor or other professional

i._____ Change in specific body measurement (ex. waist, legs, bust)

j._____ Getting below some important number (ex. below 200 or below 150)

k._____ How you feel about yourself psychologically at a certain weight

l._____ Physical comfort with your body at a certain weight

m._____ Weights of friends or family members

n._____ Weights of other people your age

o._____ Weight of a celebrity

p._____ Weight at which your spouse/ significant other finds you most attractive

Part II

For the following questions, we would like you to think about five different weights and provide information about each of them.

1. The first weight is your **current weight**.

   c. What is this weight?

Current Weight= _____ lbs

   d. Circle your current weight figure.

   e. How satisfied are you with your current weight? Please circle your answer.

1	2	3	4	5	6	7	8	9	10
very dissatisfied			*neither dissatisfied nor satisfied*						*very satisfied*

   f. How difficult is it for you to maintain your current weight?

1	2	3	4	5	6	7	8	9	10
very difficult				*somewhat difficult*					*not at all difficult*

g. How likely is it that you would maintain your current weight?

1	2	3	4	5	6	7	8	9	10
not at all likely				*somewhat likely*					*very likely*

h. What effect does your current weight have on the following factors in your life?

1	2	3	4	5	6	7	8	9	10
extremely negative				*neither negative nor positive*					***extremely positive***

a._____ Health

b._____ Social life

c._____ Sex life

d._____ Work performance (inside or outside the home)

e._____ Attractiveness to spouse or significant other

f._____ Physical presence

g._____ Others' perception of your competence

h._____ Comfort in social situations with strangers

i._____ Assertiveness

j._____ Likability

k._____ Ability to physically defend yourself

l._____ Physical strength

m._____ Comfort at family gatherings

n._____ Fitness

o._____ Stress

p._____ Anxiety

q._____ Depression

r._____ Self-confidence

s._____ Attention from others

t._____ Sexual attention/ interest from others (not including spouse/ significant other)

2. The next weight is your **dream weight**, a weight that you would choose if you could weigh whatever you wanted after weight loss surgery.

a. What is this weight?

Dream Weight= _____ lbs

b. Circle your dream weight figure.

c. Do you believe weight loss surgery will allow you to achieve this weight?

( ) Yes ( ) No

d. How long after your weight loss surgery do you expect it will take for you to achieve your dream weight? Please select one answer.

( )	3 months	( )	5 years
( )	6 months	( )	8 years
( )	1 year	( )	10 years
( )	2 years	( )	I never expect to achieve this weight.

3. The next weight is your **happy weight**. This weight is not as ideal as your dream weight. It is a weight, however, that you would be happy to achieve from weight loss surgery.

a. What is this weight?

Happy Weight= _____ lbs

b. Circle your happy weight figure.

c. Do you believe weight loss surgery will allow you to achieve this weight?

( ) Yes ( ) No

d. How long after your weight loss surgery do you expect it will take for you to achieve your happy weight? Please select one answer.

( )	3 months	( )	5 years
( )	6 months	( )	8 years
( )	1 year	( )	10 years
( )	2 years	( )	I never expect to achieve this weight.

4. The next weight is your **acceptable weight**. This weight is one that you would not be particularly happy with, but one that you could accept after weight loss surgery, since it is less than your current weight.

a. What is this weight?

Acceptable Weight= _____ lbs

b. Circle your acceptable weight figure.

c. Do you believe weight loss surgery will allow you to achieve this weight?

( ) Yes ( ) No

d. How long after your weight loss surgery do you expect it will take for you to achieve your acceptable weight? Please select one answer.

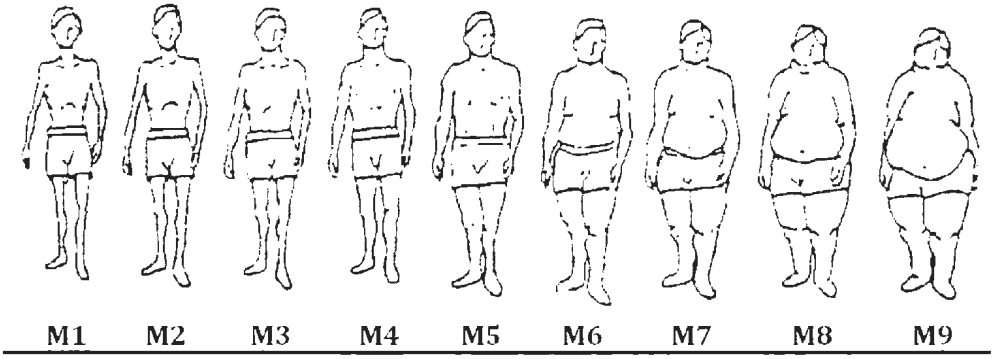
( )	3 months	( )	5 years
( )	6 months	( )	8 years
( )	1 year	( )	10 years
( )	2 years	( )	I never expect to achieve this weight.

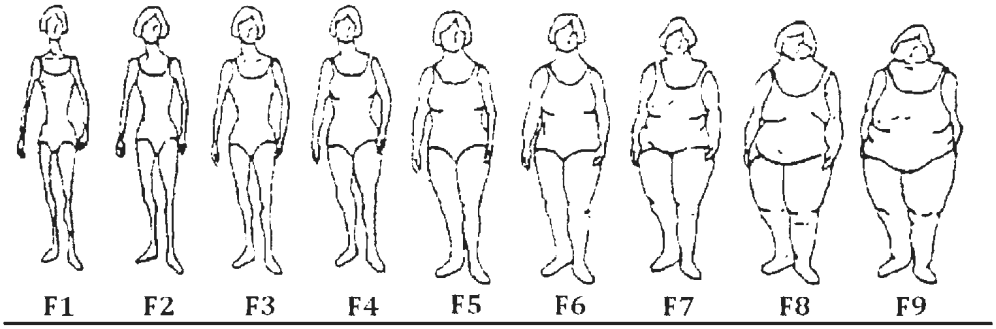
5. The last weight is your **disappointed weight**. It is one that is less than your current weight, but one that you could not view as successful in any way. You would be disappointed if this was your final weight after weight loss surgery.

a. What is this weight?

Disappointed Weight= _____ lbs

b. Circle your disappointed weight figure.





Part III

1. My weight became a concern in my life during/ after...

- Childhood ( )
- Pregnancy
  ( ) 1st ( ) 2nd ( ) 3rd ( ) 4th or higher
- Illness or injury
  ( ) personal ( ) close friend or family member
- Bereavement ( )
- Lifestyle change
  ( ) left home ( ) new job ( ) other
- Other
  Please specify_____.

2. How knowledgeable are you about weight loss surgery? Please circle your answer.

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
not at all knowledgeable				*somewhat knowledgeable*					*very knowledgeable*

3. What sources of information have you used to learn about weight loss surgery? Please check as many as applicable.

( )	Internet website	( )	Medical specialist (ex. Cardiologist, Diabetes specialist)
( )	Social media (ex. blog, facebook, twitter, online forum etc.)	( )	Other health care professional
( )	Family and/or friends	( )	Scientific papers
( )	Support group	( )	I have no source of information
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APPENDIX C: Knowledge Translation Activities

Knowledge translation activities:

a. **Local**

- **Translational Research Program in Bariatric Care meeting**

  St. John's, March 13, 2012 [oral]

  - **Price H.I.** Preliminary results of the weight loss goals and expectations of laparoscopic sleeve gastrectomy patients in Newfoundland & Labrador.

- **Memorial University Reunion 2012: Faculty of Medicine**

  St. John's, August 10, 2012 [poster], 1st Place Poster Prize

  - **Price H.I.**, Gregory D., Twells L. Postoperative weight loss goals and expectations of laparoscopic sleeve gastrectomy candidates in Newfoundland and Labrador.

- **Clinical Epidemiology Seminar Series**

  Faculty of Medicine, Memorial University, St. John 's, October, 24, 2012 [oral]

  - **Price H.I.** Weight loss goals and expectations of bariatric surgery candidates in Newfoundland & Labrador: An M.Sc. project in our Faculty.

- **NLCAHR Research Exchange Group on Women's Health/ Gender and Health**

  St. John's, November 27th, 2012 [oral]

  - Temple Newhook, J., **Price, H.I.**, Gregory D., and Twells LK. "Fat

Girls" and "Big Guys": Gender and Weight Loss Surgery

b. **National**

- **Canadian Obesity Student Meeting, Canadian Obesity Network**

  Edmonton, Alberta, June 24-27, 2012 [oral and poster], 1st Place Oral Presentation Prize

  - **Price H.I.**, Gregory D., Twells L. Postoperative weight and body image expectations of bariatric surgery candidates in relation to BMI status and comorbid health risk in Newfoundland and Labrador.[oral]
  - **Price H.I.,** Gregory D., Twells L. The impact of weight and weight loss expectations of sleeve gastrectomy candidates in Newfoundland & Labrador. [poster]

- **Advancing Excellence in Sex, Gender, and Health Research IGH conference**

  Montréal, Québec, October 29-31, 2012 [poster]

  - Temple Newhook, J., **Price, H.I.**, Gregory D., and Twells LK. Exploring bariatric surgery as a gendered phenomenon.

c. **International**

- **Obesity 2012- 30th Annual Scientific Meeting**

  San Antonio, Texas, September 20-24, 2012 [posters]

  - **Price H.I.,** Gregory D, Twells LK. Body silhouette and weight loss expectations as they relate to BMI and comorbid health risk in laparoscopic sleeve gastrectomy candidates in Newfoundland and Labrador.

- **Price H.I.,** Gregory D, Twells LK. Postoperative weight and body image expectations of bariatric surgery candidates in relation to BMI status and comorbid health risk in Newfoundland and Labrador.
- Temple Newhook, J.R., **Price, H.I.**, Gregory, D.M., and Twells LK. Exploring bariatric surgery as a gendered phenomenon.
- Temple Newhook, J.R., **Price, H.I.**, Gregory, D.M., Twells LK. Expectations of weight loss, health outcomes, and life transformation after bariatric surgery.
- Temple Newhook, J.R., Gregory, D.M., **Price, H.I.** and Twells LK**.** Bariatric patients' perspectives on the casues of "severe obesity".

Planned future knowledge translation activities:

- **Publication of research findings**

  Manuscript submitted to Obesity Surgery, *March 2013*

  - **Price H.I.**, Gregory D., Twells L. A disconnect between the postoperative weight loss expectations of laparoscopic sleeve gastrectomy candidates and evidence-based clinical weight loss outcomes

- Manuscript in preparation, *winter 2013*
  - **Price H.I.,** Gregory D, Twells LK. Body silhouette and weight loss expectations as they relate to BMI and comorbid health risk in laparoscopic sleeve gastrectomy candidates in Newfoundland and Labrador.

- **Translational Research Program in Bariatric Care meeting**

  Presentation at next scheduled meeting, 2013 [oral]

  - Price H.I. Final results of weight loss and body shape expectations of bariatric surgery candidates in NL study.

- **2013 CSEB National Student Conference**

  St. John's, NL, *June 22 – 23, 2013* [oral]

- **CIHR Research Planning Meeting**

  St. John's, *June 3-6, 2013* [oral]

- **Clinical Epidemiology Research Day**

  Faculty of Medicine, Memorial University, St. John's, *2013 date TBD* [oral]

- **Bariatric Surgery Patient Support Group NL**

  St. John's, *2013 date TBD* [oral]

- **Bariatric Surgery Multi-Disciplinary Care Team**

  St. John's, *2013 date TBD* [oral]