Biopsychosocial profiles and postoperative weight-loss trajectories among bariatric surgery patients

by

Megan Perez

B.S., Oklahoma State University, 2021
M.S., The Ohio State University, 2023

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Applied Human Sciences
College of Health and Human Sciences

KANSAS STATE UNIVERSITY
Manhattan, Kansas

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Abstract

Obesity affects over one billion people worldwide and is recognized as a significant global health challenge. Metabolic and bariatric surgery (MBS) is one of the most effective treatments for individuals with severe obesity. Because patients may present with additional biopsychosocial factors related to obesity, understanding their overall health profile is important for anticipating how these factors may shape surgical outcomes. This study utilized a latent class analysis approach to identify three preoperative biopsychosocial profiles (varying in physical comorbidities, mental health diagnoses, and psychosocial supports). Next, an unconditional growth curve was used to examine the percent total weight loss (%TWL) following the first year after surgery. The growth curve showed a linear pattern of total weight loss from 1 to 12 months with meaningful individual variability, but patients' initial weight at surgery did not predict later weight trajectories. When the LCA profile classes were added as a predictor, the profiles did not significantly predict %TWL across the first year. Interpreted through the biopsychosocial model, early outcomes appear driven by shared biological effects of surgery and standardized aftercare, which may temporarily minimize the impact of preexisting psychological and social differences. The absence of differences in early postoperative weight-loss trajectories across biopsychosocial profiles suggests that a combination of shared factors may minimize the influence of preoperative psychological and social differences during the first postoperative year. Whether biopsychosocial factors exert greater influence after one-year post-surgery remains an important area for future research.

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Chapter 1 - Introduction

Obesity is recognized as a global epidemic, affecting over one billion people worldwide (World Health Organization, 2025). In 2022, approximately 40% of adults were classified as having overweight and 16% as living with obesity (Centers for Disease Control and Prevention, 2024), marking a dramatic increase from previous decades. Obesity is defined as a chronic disease characterized by excessive fat accumulation that poses health risks, including cardiovascular disease, diabetes, and certain cancers (Centers for Disease Control and Prevention, 2024). The most common metric for assessing obesity is the Body Mass Index (BMI), calculated as weight in kilograms divided by height in meters squared (kg/m^2) (Centers for Disease Control and Prevention, 2024). BMI accounts for height, making it a more standardized measure across populations, though it does not directly measure body fat percentage. This distinction is notable as two individuals with the same weight can fall into different BMI categories depending on their height. Additionally, BMI serves as a quick screening tool in clinical and research settings, even though it does not capture body composition nuances.

Metabolic and bariatric surgery (MBS) is widely considered the most effective treatment for individuals with severe or morbid obesity, producing greater improvements in weight loss and obesity-related health conditions compared to non-surgical approaches, regardless of the specific surgical procedure performed (Angrisani et al., 2015; ASMBS, 2021). Metabolic and bariatric surgery is generally indicated for adults with a body mass index (BMI) ≥ 40 kg/m^2 or a BMI ≥ 35 kg/m^2 in the presence of at least one obesity-related comorbidity (NIDDK, 2020). While diet and exercise behavioral changes remain the cornerstone of obesity management, these

approaches typically result in only short-term weight loss and are rarely sustained over time (Chao et al., 2025; van Baak & Mariman, 2023). This limitation has led many experts to view MBS as the most reliable and sustainable option for achieving significant and lasting weight reduction in cases of severe obesity (Cho et al., 2023) MBS aims to reduce food intake and/or nutrient absorption, leading to significant and sustained weight loss. Common types of MBS include Roux-en-Y gastric bypass and sleeve gastrectomy (ASMBS, 2021)**.** While each surgery type varies, all share the goal of improving health outcomes and reducing obesity-related comorbidities. Surgical options continue to evolve based on emerging research, local practices, and the expertise of surgical teams in different regions.

Beyond the effectiveness of MBS itself, it is important to consider the health profile of patients seeking these procedures, as many present with obesity-related comorbidities that significantly impact overall outcomes. Conditions such as type 2 diabetes, obstructive sleep apnea, and hypertension are highly prevalent among MBS candidates (El-Hadi et al., 2014). Moreover, obesity is estimated to contribute to the majority of primary hypertension cases, accounting for approximately 65–78% of occurrences (Shariq & McKenzie, 2020).

Beyond physiological factors, psychosocial and clinical characteristics present prior to surgery play an important role in metabolic and bariatric surgery (MBS) outcomes. Mental health diagnoses are highly prevalent among bariatric surgery candidates, with estimates suggesting that approximately one-quarter to two-thirds of patients meet criteria for at least one psychiatric diagnosis before surgery (Fisher et al., 2017). The most commonly identified preoperative conditions include depression, anxiety disorders, disordered eating behaviors, and substance use, with many patients presenting with multiple co-occurring diagnoses (Kiser et al., 2023a; Kiser et al., 2023b). These conditions are clinically salient, as patients with untreated or undertreated

psychiatric concerns are more likely to require additional follow-up or delay prior to surgical approval (Kiser et al., 2022).

Preoperative psychological distress may interfere with patients' ability to adhere to surgery guidelines, particularly during periods of stress or when coping resources are limited. Symptoms such as disordered eating, impulsivity, and emotional dysregulation have been observed more frequently among patients who experience poorer weight loss trajectories, underscoring the importance of identifying psychosocial risk factors before surgery (Mauro et al., 2024). As a result, clinical practice places strong emphasis on preoperative psychological screening to identify and address psychiatric concerns before surgery, with the goal of improving patient readiness, strengthening coping resources, and supporting adherence to the behavioral demands of bariatric care**.** This emphasis reflects the role of preoperative evaluation not only in identifying risk, but also in facilitating timely intervention and engagement in appropriate behavioral health resources prior to surgery (Kiser et al., 2023a).

Understanding the role of social support is essential when examining MBS and weight loss outcomes. Social support can take many forms, including in-person relationships and virtual communities. Even online platforms, such as program-specific Facebook groups or virtual support groups, have been shown to help patients maintain engagement and improve weight loss outcomes after MBS (Athanasiadis et al., 2022). Support systems provide more than just encouragement; they create a sense of accountability and belonging that can help patients navigate the challenges of lifestyle changes. When individuals feel connected and understood, they are often more motivated to stick with treatment plans and overcome setbacks.

Chapter 2 – Literature Review

Biopsychosocial Model

The biopsychosocial model explains health and illness as the result of interactions among biological, psychological, and social factors (Miles, 2013). This approach marked a major shift from the traditional biomedical model, which viewed illness through a dualistic lens that separated mind and body (Borrell-Carrió et al., 2004). George Engel, developer of the biopsychosocial model, criticized this separation for focusing only on treating the body while ignoring the person's emotions, social networks, and life story (Borrell-Carrió et al., 2004). He argued for a more integrated perspective, showing that emotions such as fear, anger, neglect, and attachment can influence physical development and health (Borrell-Carrió et al., 2004). Rather than seeing illness solely as a problem with the body's normal functions, the biopsychosocial model recognizes that psychological processes (e.g., emotions, coping strategies) and social contexts (e.g., relationships, socioeconomic status) play a significant role in both the onset and progression of disease (Bolton & Gillett, 2019; Xiao et al., 2021).

At its core, the biopsychosocial model suggests that health and illness result from the connection of three domains: biological, psychological, and social. Biological factors such as genetics, comorbid conditions, and physiological functioning interact with psychological variables like mood, cognition, and behavior, while social determinants, including family support, cultural norms, and access to care, shape health trajectories (Palla et al., 2025). Recent research supports this view as one study found that psychological resilience and perceived social support were strongly associated with mental health among emerging adults, whereas biological factors showed weaker links (Palla et al., 2025). This interconnection explains why individuals with similar physical conditions often experience different outcomes based on their psychosocial

context.

The biopsychosocial model has been widely applied in chronic illness management, mental health care, and rehabilitation (Smedema et al., 2017; Tripathi et al., 2019; Xiao et al., 2021). In the context of MBS, this framework is especially relevant because weight-loss success depends not only on surgical intervention but also on psychological readiness, behavioral change, and supportive environments (Sarwer & Heinberg, 2020). Integrating this model into bariatric care promotes unique approaches that combine medical treatment with mental health support and social resources, fostering sustainable lifestyle changes and improving quality of life. Guided by this perspective, the present study examines MBS outcomes within a holistic context, exploring how mental health diagnoses and treatment, physical comorbidities, and social support interact to influence postoperative weight-loss trajectories. This theoretical foundation highlights the need for individualized, complex care strategies that move beyond biological elements to address the other factors shaping health and recovery.

MBS Weight Loss Patterns

Although MBS is considered the most effective treatment for obesity, weight-loss trajectories appear to vary from person to person. One longitudinal study demonstrated clinically significant weight loss over a 3-year period**,** with the majority of weight loss occurring during the first postoperative year (Courcoulas, 2013). This early drop aligns with research using a growth mixture modeling approach, which identified three main patterns of weight loss over time. These patterns differed in how much weight patients lost during the first year; however, in later years, similar weight loss trajectories became evident (Slurink et al., 2024). Interestingly, another study found patients who lost more than average in the first year (about 39%TWL compared to the usual 25–30%) also tended to regain the most weight by year three, though the amount regained

was still small (Slurink et al., 2024). Consistent with these findings, other research has shown that weight loss typically stabilizes around 11–13 months post-surgery, when patients reach their lowest weight. Most of the reduction occurs within the first five months, with the fastest drop in the first two weeks (Boustani et al., 2024). In addition to these findings, a large retrospective study used latent class growth analysis to examine weight loss patterns up to five years after surgery (Voorwinde et al., 2022). Five distinct trajectories were identified: an average, fairly stable trajectory characterized by moderate weight loss and minimal regain over time; an above average trajectory marked by greater initial weight loss followed by partial regain in later years; and three smaller groups showing less favorable or atypical patterns, including low response with consistently lower total weight loss, rapid early weight loss followed by regain, and continued weight loss across the five-year follow-up period (Voorwinde et al., 2022).

Given the wide variation in weight-loss trajectories after MBS, researchers have sought to identify clinical, behavioral, and psychosocial factors that predict these differences. One study revealed that limited physical activity, higher initial BMI, lower education level, diabetes, and poor attendance at postoperative appointments all predicted less weight loss in the first year after surgery (Hatoum et al., 2009). Building on these findings, other research has examined how a broader range of factors contribute to variability in outcomes. For example, Nielsen et al. (2020) found that several clinical, demographic, and psychosocial variables together explained about 59% of the variation in weight loss. Among these, type of surgery and diabetes status were the strongest predictors, followed by economic resources, sex, binge eating disorder, depression, household type, and physical activity (Nielsen et al., 2020). When early postoperative responses were included, prediction accuracy improved, with early weight loss being the most influential factor, alongside changes in eating behavior, hormonal shifts, psychological traits, and

demographic characteristics (Nielsen et al., 2020).

Mental Health Diagnoses and MBS Outcomes

Although research using latent class analysis (LCA) in bariatric populations is limited, particularly among adults, one foundational study in adolescents demonstrated meaningful heterogeneity in psychiatric presentations. This study identified three distinct latent classes of mental health symptoms (high psychopathology, low psychopathology, and nonspecific psychopathology) among adolescent bariatric candidates, illustrating that bariatric patients often present with diverse psychological profiles even before surgery (Sysko et al., 2011).

The current literature reveals mixed results on the impact of MBS on mental health diagnoses. Across studies included in a meta-analysis, reductions in depression prevalence ranged from 8% to 74%, and decreases in symptom severity ranged from 40% to 70% (Dawes et al., 2016). Fisher et al. (2017) found that mental illness status did not significantly affect weight loss during the first two years post-surgery, suggesting that early outcomes may not differ by psychiatric history (Fisher et al., 2017). Similarly, Aylward et al. (2024) explored the trajectory of symptom improvement and found that anxiety and depression symptoms significantly improved at both six weeks and three to six months postoperatively. Notably, anxiety symptoms improved more rapidly than depression, suggesting various patterns of psychological recovery following surgery (Aylward et al., 2024).

However, emerging evidence suggests that early postoperative improvements may not fully capture longer-term psychological patterns. One study found that patients with depression prior to surgery were more likely to continue experiencing depression at 24–36 months postoperatively, despite no differences observed during the first postoperative year (de Zwaan et al., 2011). Likewise, patients with preoperative anxiety were more likely to experience persistent

anxiety at both short-term and long-term follow-ups (de Zwaan et al., 2011). Consistent with this pattern, recent work demonstrates that while preoperative psychiatric diagnoses may not differentiate early weight loss outcomes, they remain clinically relevant markers of psychosocial risk within the first postoperative year (Kiser et al., 2023a).

Research also highlights the role of psychological diagnoses in weight regain or loss over time. The meta-analysis by Dawes and colleagues found that neither depression nor binge eating disorder consistently predicted differences in weight outcomes (Dawes et al., 2016). Similarly, Fisher et al. (2017) found no significant differences in weight loss between patients with and without mental illness during the first two years post-surgery, suggesting that early outcomes may not fully capture long-term risks (Fisher et al., 2017). However, another study found that patients who experience weight regain tend to have higher rates of psychiatric comorbidities, including current binge-eating disorder, lifetime bulimia nervosa, obsessive-compulsive disorder, and alcohol abuse or dependence (Mauro et al., 2024). Longitudinal studies reveal a more complex picture. For example, one study found that preoperative depression, whether current or lifetime, does not appear to influence postoperative weight loss either 6–12 months or 24–36 months after surgery (de Zwaan et al., 2011). In contrast, a lifetime history of anxiety predicts less weight loss, and patients with both depression and anxiety at baseline lose significantly less weight overall (de Zwaan et al., 2011). Another longitudinal study reported that approximately nine patients regained an average of 35% of their lost weight within two years, and this short-term regain was significantly associated with binge eating but not depression or anxiety (Freire et al., 2020). At the 12-year follow-up, weight regain was far more common, and mental health concerns had reemerged, with binge eating (48%), depression (46%), and anxiety (63%) prevalent. At this stage, weight regain was significantly associated with all three conditions, and

individuals with multiple psychiatric disorders experienced the greatest regain and least sustained weight loss (Freire et al., 2020).

Social Support and MBS

Building on the foundation of mental health, social support often provides the practical and motivational resources patients need to maintain healthy behaviors after surgery. More broadly, weight loss and its maintenance occur within a social context, such that long-term success is shaped not only by biological and behavioral factors, but also by interpersonal relationships and social environments. One conceptual review identified social support as a central factor associated with sustained weight loss, while lack of support was linked to weight regain across weight loss modalities (Elfhag & Rössner, 2005). Research in the bariatric literature similarly indicates that social support plays an important role in postoperative outcomes, although it is defined differently across studies. For example, a systematic review of bariatric surgery outcomes found that social support, particularly participation in support groups, was generally associated with greater postoperative weight loss, though findings varied across studies (Livhits et al., 2011).

Research further suggests that supportive relationships prior to surgery may shape longer-term outcomes following bariatric procedures. In a cohort of bariatric surgery candidates followed for up to two years postoperatively, greater preoperative emotional support and more frequent contact with friends were positively associated with percent total weight loss (%TWL) at 3, 12, and 24 months (Tymoszuk et al., 2018). Similarly, preoperative psychosocial context appears relevant for postsurgical outcomes, as greater perceived social support and lower stress prior to surgery have been shown to predict more favorable weight loss following bariatric procedures (Stromberg et al., 2020).

Current research highlights that social support in weight management is not only beneficial, but also complex and highly dependent on patients' perceptions. Romantic partnerships, including marriage, represent a particularly salient relational context in bariatric care. A narrative review showed that spousal relationships influence bariatric surgery outcomes through shared health behaviors, emotional support, accountability, and lifestyle "spillover" effects, highlighting marital status as a meaningful, though imperfect, indicator of patients' social environments (Ferriby et al., 2015). Importantly, however, qualitative research suggests that the presence of a partner does not uniformly translate into effective support. In a qualitative study of patients, partners, and children participating in adult weight management and bariatric programs, patients viewed family support as essential to their success, while partners and children often failed to recognize their own role as support providers (Albright et al., 2020). Patients' perception of support, rather than the mere presence of a partner or family member, was central to adherence and motivation, and perceived lack of support or partner sabotage was described as particularly disruptive (Albright et al., 2020).

Consistent with this work, patients with stronger support networks demonstrate better adherence to postoperative recommendations, including dietary restrictions and physical activity (Jawara et al., 2024; Jøranli et al., 2023). Research among bariatric surgery candidates further indicates that peer and romantic relationships are meaningfully associated with health behaviors even prior to surgery, including uncontrolled eating and engagement in physical activity (Pratt et al., 2016). Conversely, lack of support has been linked to higher rates of noncompliance and weight regain, with some patients describing weight regain as "a lonely struggle" (Tolvanen et al., 2020).

Support groups, whether in person or virtual, offer opportunities for shared experiences and problem-solving, which may reduce feelings of isolation and enhance engagement. A content analysis of bariatric surgery–related Facebook support groups found that patients most commonly used these platforms to exchange information, document postoperative progress, and provide encouragement to others (Koball et al., 2017). Patients also report being motivated by partners and friends to engage in physical activity, suggesting that companionship enhances adherence and accountability (Jawara et al., 2024). Similarly, patients have described deriving motivation from social support partners who actively collaborate with them in physical activity, reinforcing the importance of relational support for sustaining exercise behaviors (Ogle et al., 2015). Practical assistance, such as help with transportation, has also been shown to improve adherence to follow-up appointments (Jawara et al., 2024). In open-ended interviews with MBS patients and their spouses, patients who received a Roux-en-Y gastric bypass attributed weight loss success to shared efforts such as joint meal planning and portion control, further underscoring the role of relational support in sustaining health behavior change (Pories et al., 2016

Social Support with Other Body Procedures and Serious Illness

Social support also plays a role in health outcomes beyond MBS. In elective procedures such as body contouring, social support has been linked to more positive body image and better maintenance of weight loss (Comerci et al., 2023). This influence extends beyond cosmetic interventions to serious health conditions, shaping both treatment experiences and recovery. Among older adults with cancer, functional limitations and increased need for assistance with daily activities are associated with greater unmet social support needs and poorer psychosocial outcomes (Kadambi et al., 2019). Similarly, a more recent study of breast cancer survivors

showed that higher levels of functional social support was associated with better psychosocial adjustment and greater resilience, which was closely linked to quality of life during survivorship (Pulungan et al., 2026). Stroke survivors also benefit from strong social networks, with greater support associated with lower stress and higher motivation for rehabilitation (Moon & Cho, 2011).

Social support is equally important for managing chronic conditions. In one study of African American and Latino adults, support from family and friends was linked to better blood sugar testing and adherence to a diabetes meal plan (Roseland et al., 2008). Additional research shows that social support improves diabetes self-management behaviors by boosting self-efficacy and reducing distress; effects observed across all diabetes types (Chan et al., 2020). Diabetes distress also plays a key mediating role in glycemic control for individuals treated with insulin (Chan et al., 2020). Social support has been linked to the devotion of hypertension management. One study discovered that social support was strongly linked to better medication adherence in hypertensive patients, with support from friends or community resources having the greatest impact, followed by relatives and immediate family (Pan et al., 2021). These findings recognize the complex role of social support in promoting adherence, reducing emotional load, and improving health outcomes across diverse chronic conditions. However, research has not examined whether these patterns extend to MBS patients and how they interact with physical and mental health factors to influence weight-loss outcomes. The present study addresses this gap by identifying biopsychosocial profiles that include social support and testing their predictive value for postoperative weight-loss trajectories.

Physical Comorbidities and MBS

Most current literature focuses on how MBS affects physical comorbidities in patients. A

large cohort study of 6,910 patients demonstrated a 47% decrease in all-cause mortality, a 68% decrease in cardiovascular mortality, and a 34% reduction in cardiac events compared to nonsurgical controls after 4.6 years (Doumouras et al., 2021). Clinical trials further show diabetes remission rates of 33–90% one year after surgery versus 0–39% with medical management, with higher remission rates persisting over time (Affinati et al., 2019). Hypertension outcomes are similarly favorable; in one study of 197 patients, 48% had hypertension, and 68% of those achieved remission one-year post-surgery (Benaiges et al., 2015).

These condition-specific improvements translate into broader health benefits, as sustained weight loss and comorbidity remission significantly reduce long-term risks and enhance overall quality of life (Wood et al., 2021). Research indicates that surgery can lower the risk of major cardiovascular and diabetes-related complications (e.g. heart attack, stroke, kidney damage, and nerve damage) by up to 65% among patients with type 2 diabetes (Poirier & Auclair, 2014). Significant weight reduction is strongly linked to improvements in blood pressure, with many patients experiencing hypertension remission (Cohen, 2017). These changes contribute to improved heart and kidney function and reduce the likelihood of serious complications over time (Cohen, 2017). Collectively, these findings underscore bariatric surgery's role, not only in achieving weight loss, but in transforming overall health.

Physical comorbidities can shape weight loss trajectories by influencing both behaviors and physiological processes. While research directly examining these effects with MBS is limited, emerging evidence suggests that certain conditions can impact postoperative outcomes. For example, chronic pain has been linked to reactive eating patterns, a preference for high-calorie, low-nutrient foods to soothe discomfort, and limited engagement in physical activity

(Janke & Kozak, 2012). Participants in qualitative studies describe how pain diminishes motivation for weight management, stating, *"The pain took away the desire to lose weight…I was just like, 'Oh, forget it. I don't want to worry about that right now.' You're just so worn out, the only thing you can think to do is give yourself a sugar kick and try to get something done"* (Janke & Kozak, 2012, p. 2030). These behaviors are intensified by low self-efficacy for healthy choices and low mood, which may further challenge weight management motivation. Beyond the behavioral challenges posed by chronic pain, other physical comorbidities such as type 2 diabetes and hypertension also appear to influence weight loss and long-term outcomes following bariatric surgery. Research indicates that patients with obesity and type 2 diabetes lose less weight following MBS compared to those without type 2 diabetes, and this difference is largely explained by patients who do not achieve type 2 diabetes remission postoperatively (Rebelos et al., 2023). Hypertension can also influence long-term outcomes, as observational studies show blood pressure often worsens after the first year in parallel with weight regain (Benaiges, et al., 2015). In one 36-month follow-up study, 21.9% of patients who achieved hypertension remission at 12 months experienced relapse by year three, and weight loss was an independent factor associated with this relapse (Benaiges, et al., 2015). Sleep apnea, or sleep disordered breathing, has been shown to influence weight loss. Insufficient sleep and poor sleep quality can disrupt the regulation of appetite-related hormones, therefore, increasing ghrelin (which stimulates hunger) and reducing leptin (which signals satiety) (Leinum et al., 2009). These changes have been shown to heighten appetite and cravings for high-calorie foods, contributing to weight gain (Leinum et al., 2009).

Overall, existing research provides foundational evidence that physical comorbidities can influence health behaviors and long-term weight management outcomes. Similarly, mental health

symptoms and treatment have been shown to affect adherence to lifestyle changes and overall health outcomes. However, much of the existing literature has focused on physical or psychological factors separately, with limited attention to how these factors intersect within the context of MBS. This gap underscores the need for an integrative approach that considers the combined influence of physical and mental health factors on sustained weight loss, which is a central aim of the present study. By addressing these intersections, this research seeks to advance understanding of the complex biopsychosocial processes that underlie MBS outcomes.

Present Study

Existing research on MBS outcomes has primarily examined mental health, physical comorbidities, and social support in isolation, with few studies integrating these factors, especially in a longitudinal context or using analytic approaches such as latent class analysis to examine patterns across domains. Research is also limited regarding physical health comorbidities as predictors of postoperative weight loss, despite their potential influence on recovery and adherence to lifestyle changes. This gap limits our understanding of how these psychosocial and clinical variables interact to influence weight-loss trajectories over time. The present study addresses this limitation by using advanced statistical modeling to capture the complexity of these relationships. Specifically, the study aims to identify distinct biopsychosocial profiles among MBS patients using latent class analysis (LCA) based on mental health diagnoses, current mental health treatment, physical comorbidities, and patient social support. These profiles will then be examined as predictors of weight-loss trajectories through growth curve modeling, allowing for a nuanced understanding of how psychosocial and clinical factors jointly shape postoperative outcomes. By identifying these profiles, the findings can guide clinicians in tailoring pre- and postoperative interventions to patients' unique

biopsychosocial needs. This approach has the potential to improve adherence, enhance recovery, and achieve more weight loss long-term.

Research Questions:

1. What are the distinct biopsychosocial profiles of MBS patients?
2. What is the association between the identified biopsychosocial profiles and weight loss trajectories of MBS patients?

Chapter 3 - Method

Participants and Procedure

This study involved a secondary analysis of data drawn from a descriptive study that used electronic health record (EHR) information to examine preoperative psychiatric and behavioral predictors of metabolic and bariatric surgery (MBS) outcomes (Kiser et al., 2023). Participants were adults pursuing MBS at a Midwest medical center who completed a standardized preoperative psychological evaluation between August 2019 and December 2020. The study was approved by The Ohio State University Institutional Review Board. Prior investigations using this dataset have examined associations between patient demographic characteristics, DSM diagnoses identified during the preoperative psychological evaluation, dieting and eating patterns, engagement in follow-up psychological care, and postoperative outcomes (Kiser et al., 2023a; Kiser et al., 2023b; Kiser et al., 2025; Swager et al., 2024). The present study is the first to use this dataset to examine how distinct biopsychosocial profiles predict postoperative weight-loss trajectories among MBS patients over time.

The comprehensive preoperative psychological evaluation included a structured clinical interview assessing current and historical mental health diagnoses, eating disorders, substance use disorders, and any current or previous mental health treatment. The initial sample consisted of 508 individuals; however, 187 participants were excluded for the following reasons: failure to proceed with MBS after completing the evaluation (n = 186), lack of readmission data within three months postoperatively (n = 1), or reported a cancer diagnosis prior to surgery (n = 12). The final sample included 309 patients. Inclusion criteria required that participants had completed their psychological evaluation with the same licensed psychologist during the specified timeframe, were at least 18 years of age, had a body mass index (BMI) ≥ 35 with

obesity-related physical conditions or ≥ 40 without comorbidities, and had available postoperative data, including percent total weight loss (%TWL) for at least one follow-up visit and readmission data within three months after surgery.

Measures

Clinical Demographics. Demographic variables included patient age, sex, highest level of education, employment status, insurance type, surgery type, and marital status at the time of the psychological evaluation. These variables were initially extracted from the EHR (Kiser et al., 2023). For this study, marital status was coded categorically, with 0 = coupled/married and 1 = single.

Anthropometrics. Patient weight, height, and BMI were obtained during the preoperative psychological evaluation, at the time of surgery, and at postoperative clinic visits occurring approximately 2–3, 6, and 12 months after surgery. All patients had their height and weight recorded by trained nursing staff at each visit. %TWL was calculated from the date of surgery to each follow-up point (Brethauer, et al., 2015).

Current Mental Health Diagnoses. Diagnostic information for mental health variables was obtained from the preoperative psychological evaluation and corresponding electronic health record documentation. Each patient participated in a structured clinical interview in which the evaluating psychologist recorded all current DSM-5 diagnoses. From these documented diagnoses, three dichotomous variables were created for inclusion in the latent profile analysis, each coded as yes = 1, no = 0: a mood disorder diagnosis, coded “yes” when major depressive disorder or bipolar disorder was reported; an anxiety disorder diagnosis, coded “yes” when any DSM-5 anxiety disorder (e.g., generalized anxiety disorder, panic disorder, social anxiety disorder) was recorded; an eating disorder diagnosis, coded “yes” when any DSM-5 eating

disorder (e.g., anorexia nervosa, binge eating disorder, bulimia) was recorded; and a substance use disorder (SUD) diagnosis, coded "yes" when a current DSM-5 substance use disorder was identified during the evaluation. In addition to these binary variables, a continuous total diagnosis count (range = 0–5) was calculated by summing all current DSM-5 diagnoses noted in the clinical evaluation.

Current Mental/Behavioral Health Treatment. Patients were asked to report ongoing mental or behavioral health treatment (e.g., therapy or counseling) during the preoperative appointment was coded dichotomously (yes = 1, no = 0),

Social Support of Surgery. Social support for surgery was assessed once during the preoperative psychological evaluation. Patients were first asked whether they perceived having support specific to the surgical process. Those who endorsed having support were then asked to identify the individual(s) from whom they expected to receive that support (e.g., spouse or partner, family, friend). Perceived support for surgery was coded dichotomously (yes = 1, no = 0) for use in the latent profile analysis.

Major Physical Comorbidities. Major physical comorbidities were extracted from the electronic health record during the preoperative medical evaluation. Three physical comorbidity indicators were created and coded dichotomously (1- yes, 0 = no): cardiometabolic conditions (defined as the presence of at least one of hypertension, dyslipidemia, or cardiovascular disease), type 2 diabetes, and obstructive sleep apnea (OSA). Hypertension, dyslipidemia, and cardiovascular disease were grouped as a composite cardiometabolic condition indicator, consistent with prior bariatric and obesity literature conceptualizing these conditions as interrelated manifestations of cardiometabolic disease associated with obesity and shared metabolic risk pathways (Cohen, 2017; Shariq & McKenzie, 2020). A total physical comorbidity

score was then calculated by summing these three indicators, with higher scores indicating greater physical comorbidity.

Analysis Plan

A latent profile analysis (LPA) was estimated in Mplus 8 (Muthén, 2025) to identify distinct psychosocial and comorbidity profiles among bariatric surgery patients. Profiles were characterized using indicators of mental health diagnoses (anxiety symptoms, mood disorders, eating disorders, and substance use indicators), mental health treatment, social support for surgery, marital status, and the number and type of major physical comorbidities (e.g., diabetes, obstructive sleep apnea, and cardiometabolic risk). Models with increasing numbers of classes (1–7) were compared using multiple fit indices, including the Akaike Information Criterion (AIC), sample-size adjusted BIC (aBIC), entropy, and likelihood ratio tests (Lo–Mendell–Rubin and Bootstrap LRT), which collectively assess model fit, parsimony, and classification accuracy. After selecting the optimal class solution, %TWL at 1, 2, 3, 6, and 12 months were modeled using latent growth curve analysis, with class membership included as a predictor of growth factors to examine differences in weight loss outcomes across profiles. Model fit was evaluated using multiple global fit indices standard for structural equation modeling, including the chi-square test of model fit (χ^2), the Comparative Fit Index (CFI), and the Root Mean Square Error of Approximation (RMSEA) with 90% confidence intervals (Kline, 2023). Model fit was considered acceptable based on these guidelines, with CFI values of .90 or greater and RMSEA values below .08 indicating adequate fit (Kline, 2023).

Chapter 4 – Results

Descriptive Statistics

Participant clinical and demographic characteristics are presented in Table 1. The sample had a mean age of 41.33 years (SD = 10.56) and was primarily female (81%). Most participants identified as White (61.2%), followed by Black (28.3%) and other racial identities (6.5%). Slightly more than half of the sample was single (56%), while 44% were married or partnered. Patients most commonly underwent Roux-en-Y gastric bypass (58%), with the remaining participants receiving sleeve gastrectomy (42%). The majority of patients had private insurance (56%), while 37% were publicly insured. At the time of surgery, patients had a mean weight of 293.97 lbs (SD = 58.03) and a mean body mass index (BMI) of 47.3 kg/m² (SD = 7.82). Approximately one-third of patients reported having social support for surgery (34.2%). Among those who identified a support person, family members were most frequently reported (81%), followed by friends (10%) and partners or spouses (9%). See Table 1 and Table 2 below for descriptive statistics.

Table 4.1 Clinical Demographics

	M	n	*SD* or %
Age	41.33		10.56
Sex			
Male		58	19%
Female		251	81%
Race			
White		197	61.2%
Black		91	28.3%
Other		21	6.5%
Marital Status			
Coupled		136	44%
Single		173	56%
Surgery Type			
Roux-en-Y Gastric Bypass		179	58%
Sleeve gastrectomy		130	42%
Insurance Status			
Public		119	37%
Private		180	56%
Weight at Surgery (lbs)	293.97	309	58.03
BMI at Surgery	47.3	308	7.82
%TWL - 1 month	7.91	302	3.05
%TWL - 3 months	16.78	108	4.51
%TWL - 6 months	23.23	206	6.00
%TWL – 12 months	28.05	107	8.74

Table 4.2 Descriptive Statistics for Biopsychosocial Variables Included in the Latent Profile Analysis (Full Sample)

	N	%
Bipolar Disorder		
Yes	10	3%
No	299	97%
Anxiety Disorder		
Yes	122	40%
No	187	61%
Major Depressive Disorder		
Yes	122	40%
No	187	61%
Eating Disorder		
Yes	48	15%
No	261	85%
Substance Use Disorder		
Yes	34	11%
No	275	89%
Mental Health Treatment		
Yes	53	17%
No	256	83%
Hypertension		
Yes	158	51%
No	151	49%
Dyslipidemia		
Yes	76	27%
No	233	75%
Cardiovascular Disease		
Yes	35	11%
No	274	89%
Type 2 Diabetes		
Yes	74	24%
No	235	76%
Obstructive Sleep Apnea		
Yes	141	46%
No	168	54%
Social Support for Surgery		
Yes	110	34.2%
No	198	62%
Support Person		
Partner/Spouse	10	9%
Family	89	81%

Friend	11	10%

Latent Profile Analysis Model

The 3-class model was selected as the best representation of the data based on several criteria (see Table 2 for full fit indices). First, relative fit indices continued to improve across model solutions, with the 3-class model producing lower Log-likelihood (LL = -2574.3) and aBIC (5,557.66) compared to the 2-class solution. Second, both the Lo–Mendell–Rubin adjusted likelihood ratio test (LMR-LRT, $p < .001$) and the bootstrapped likelihood ratio test (BLRT, $p < .001$) indicated that the 3-class solution fit significantly better than the 2-class model. Third, the 3-class solution demonstrated excellent classification quality, with an entropy value of .88, indicating highly reliable class separation.

Although a 4-class model also converged and had high entropy (entropy = .89), the fourth class was created by mimicking a class from the 3-class model just at a slightly different level, with no meaningful differences, thus demonstrating lower theoretical interpretability than the 3-class solution. Models estimating more than four classes showed convergence warnings or estimation issues. Therefore, based on fit indices, parsimony, interpretability, and class separation, the 3-class model was kept for further interpretation. See table 3 below for class indices.

Table 4.3 Fit Indices

LCA	LL	aBIC	Entropy	LMR *p*-value	BLRT *p*-value	Class 1	Class 2	Class 3	Class 4
1-Class	-2938.81	5914.07	-	-	-	100%			
2-Class	-2661.81	5393.90	.98	< .001	< .001	66%	34%		
3-Class	-2574.30	5252.71	.88	< .001	< .001	41%	34%	26%	
4-Class	-2496.43	5130.81	.89	.18	< .001	27%	18%	16%	39%

Class Structures

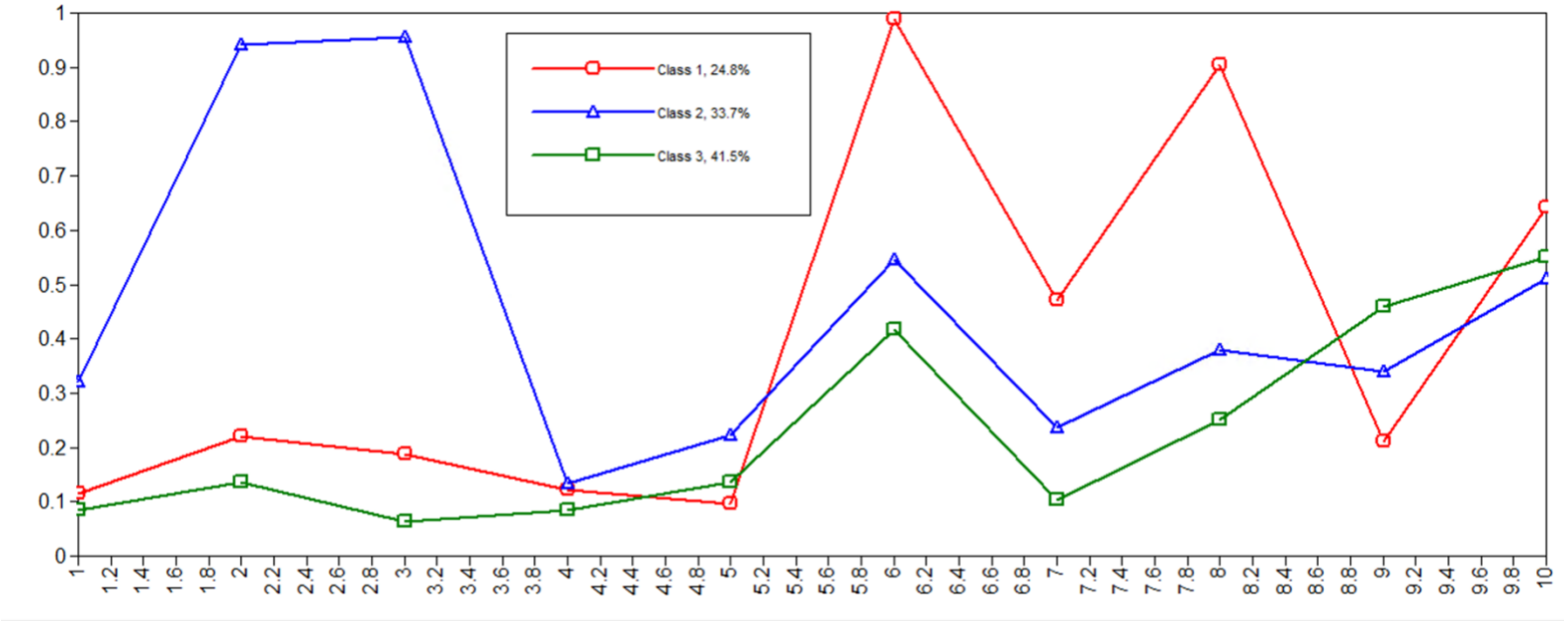
Class 1: High Physical Comorbidities & Moderate Psychiatric Comorbidities with Moderate Psychosocial Support (25% of sample). In this class, patients showed the highest average number of physical comorbidities (*M* = 3.39) and elevated probabilities of diabetes (47.0%), OSA (90.3%), and cardiometabolic conditions (98.7%). Psychosocial indicators suggested moderate distress, with meaningful probabilities of mood disorder (21.9%), anxiety symptoms (18.7%), and current SUD (12.1%). Current mental health diagnoses were moderate (*M* = 0.46). Social support remained relatively strong within this class, with 78.9% receiving support from someone and a slightly higher likelihood of being married/partnered than not (64.3%).

Class 2: Moderate Physical Comorbidities & High Psychiatric Comorbidities with High Psychosocial Support (34% of sample). Class 2 comprised of patients experiencing psychosocial distress alongside moderate physical comorbidities. Patients reported the highest number of current mental health diagnoses (M = 2.40), with very high probabilities of anxiety (95.6%) and mood disorder (94%), and a moderate probability of current SUD (13.4%) and eating disorder (22.2%). The mean physical comorbidity count indicated that patients in this group had approximately two physical conditions (M = 1.75) with diabetes (23.6%), OSA (38%), and cardiometabolic conditions

(54.5%). Social support was moderate (66%), and marital status was roughly balanced (48.9% coupled / 51.1% single). Overall, Class 2 reflects individuals with substantial internalizing symptomatology and the greatest mental health diagnostic load, while having roughly 1-2 physical comorbidities and mid-range support.

Class 3: Low Physical Comorbidities & Low Psychiatric Comorbidities with Low Psychosocial Support (42% of sample). This class demonstrated the lowest overall physical comorbidities, with the smallest mean comorbidity count ($M = 1.20$) and the lowest probabilities of diabetes (10.4%), OSA (25.0%), and cardiometabolic conditions (41.7%). Psychosocial distress was similarly low, reflected by very low probabilities of anxiety (6.4%) and mood disorder (13.5%), as well as a low number of current mental health diagnoses ($M = 0.27$). Social support was also the lowest in this group, with only 54.2% endorsing support from someone and 45% reporting being coupled. This suggests that partnership did not translate into meaningful emotional or practical support for many patients in this class. Overall, Class 3 represents individuals with minimal physical comorbidities and low psychological symptomatology, yet comparatively limited perceived support. These results highlight a subgroup that appears low-risk physically and psychologically but potentially socially under-resourced. See Figure 1 below for the graph of latent classes.

Figure 0.1 Latent Class Profiles



Note: The x-axis shows the indicators used in the latent class model. The y-axis shows the probability (0 - 1) that members of each class endorse each indicator, with different patterns showing how the classes differ.

Latent Growth Curve Analysis

The first model tested was an unconditional latent growth curve model examining whether %TWL followed a linear rate of change across the 1-, 3-, 6-, and 12-month postoperative time points. Results indicated that the linear model provided an excellent fit to the data, $\chi^2(3) = 3.41$, $p = .33$, CFI = .998, RMSEA = .021 (90% CI [.000, .101]), suggesting that a linear pattern adequately characterized changes in TWL during the first postoperative year. At 1 month after surgery, patients had lost an average of 7.91%TWL ($SE = .18$, $p < .001$). On average, %TWL then increased by about 20.36 percentage points from 1 to 12 months ($SE = 0.69$, $p < .001$).

The variation was examined and there was significant variance in the intercept and slope

($p < .001$), indicating considerable individual differences in both initial TWL and the rate of change across the year. This level of variation suggests that additional predictors could meaningfully explain why some patients lost weight more quickly than others. The correlation between the intercept and slope was not significant ($r = -.04$, $p = .78$), indicating that patients who started with higher %TWL at 1 month did not differ in their subsequent rate of weight loss compared to those who started lower.

Class Membership and Weight-Loss Trajectories

Class membership was dummy coded for inclusion as predictors of the intercept and slope, with Class 3 used as the reference group. Class 3 was selected because it displayed the lowest levels of physical comorbidities, low psychological symptomatology, and low psychosocial support, thereby representing a baseline clinical profile. When the LCA class profiles were included as predictors of slope and intercept, the model presented a good fit to the data: $\chi^2(7) = 6.39$, $p = .49$, RMSEA = .00 [90% CI: .00, .07], and CFI = 1.00). However, the conditional growth model indicates that class membership did not differentiate either baseline TWL at 1 month or the subsequent rate of change through 12 months when Class 3 (low physical comorbidity & low psychosocial distress) served as the reference. Specifically, relative to the reference class, Class 1 showed an intercept effect of 0.15 ($SE = 0.44$, $p = .74$) and a slope effect of –2.25 ($SE = 1.22$, $p = .07$), indicating no statistically significant differences from the reference class. Class 2 showed an intercept effect of 0.27 ($SE = 0.41$, $p = .50$) and a slope effect of -0.95 ($SE = 1.15$, $p = .41$), likewise indicating no significant differences from the reference class. Consistent with these results, the R^2 values were near zero for both the intercept and slope, indicating that class membership explained little additional variance in early postoperative TWL or its trajectory across the year. Although the classes differed meaningfully in profiles, these

distinctions did not translate into significant differences in initial weight loss or subsequent change over time in this model.

Chapter 5 – Discussion

In this study, the latent class analysis revealed three patient profiles. Class 1 (High Physical Comorbidity & Moderate Psychiatric Comorbidities with Moderate Psychosocial Support) represented individuals with the highest physical comorbidities. This included elevated probabilities of diabetes, OSA, and cardiometabolic conditions, paired with moderate psychosocial symptoms and a relatively strong social support network. Class 2 (Moderate Physical Comorbidity & High Psychiatric Comorbidities with High Psychosocial Support) captured a group with substantial psychosocial vulnerability, reflected in very high anxiety and mood disorder probabilities and the highest number of current mental health diagnoses, alongside moderate physical comorbidity and higher psychosocial support. Class 3 (Low Physical Comorbidity & Low Psychiatric Comorbidities with Low Psychosocial Support) reflected a broadly low-risk profile across both physical and psychosocial domains but was characterized by the lowest levels of support, despite almost half of the patients being partnered.

Prior research using latent class analysis (LCA) has demonstrated that bariatric candidates can be meaningfully grouped into three distinct psychological profiles (Sysko et al., 2011), but this research was focused on adolescents rather than adults. Specifically, Sysko and colleagues identified three psychiatric profiles among adolescents seeking bariatric surgery: a high psychopathology group characterized by elevated eating pathology alongside mood and anxiety symptoms, a low psychopathology group with minimal psychological distress, and a nonspecific psychopathology group with intermediate symptom patterns (Sysko et al., 2011). The present study extends this work to an adult bariatric population and broadens the scope of

profiling by incorporating physical comorbidities and social aspects alongside psychological indicators.

Examining the profiles more closely helps clarify why these classes remain meaningful, even in the absence of differences in early weight-loss trajectories. One possible interpretation of the Class 1 profile is that patients with substantial physical comorbidities may have already been more engaged in healthcare systems prior to surgery. High rates of diabetes, obstructive sleep apnea, and cardiometabolic conditions suggest ongoing medical management, which may increase familiarity with healthcare routines, follow-up expectations, and available support resources. This prior engagement could help explain why Class 1 patients demonstrated moderate psychiatric comorbidities and comparatively stronger perceived support despite significant physical health complexity. Rather than indicating lower psychosocial risk, this pattern may reflect differences in pathways into care, with physical health needs prompting earlier access to resources before surgery.

In contrast, the Class 2 profile may reflect patients whose primary preoperative challenges are rooted in psychological distress rather than physical health. This group exhibited the highest levels of anxiety and mood disorders alongside continued engagement in mental health treatment and comparatively strong perceived support. One possible interpretation is that these patients were already actively managing mental health concerns prior to surgery and may have mobilized support networks in response to psychosocial distress. In this sense, higher levels of support in Class 2 may function as a compensatory resource, helping patients cope with substantial internalizing symptoms at the time of surgical evaluation rather than indicating lower overall complexity.

The Class 3 profile presents a different pattern, characterized by relatively low physical comorbidity and minimal psychiatric diagnoses but the lowest levels of perceived social support, despite nearly half of patients being partnered. This combination may represent individuals who appear lower risk based on traditional medical or psychiatric indicators, but who nonetheless lack reliable support during the surgical process. One possible interpretation is that fewer health-related touchpoints prior to surgery may result in less opportunity to identify or strengthen support resources, leaving some patients under-resourced despite favorable clinical profiles. This pattern highlights the potential for psychosocial vulnerability to remain unrecognized when preoperative risk is assessed primarily through physical or diagnostic criteria.

The growth curve model helps clarify the overall pattern of weight loss during the first year after bariatric surgery. Across the sample, patients showed steady and consistent weight loss from 1 to 12 months, which aligns with what is typically observed in the early postoperative period (Boustani et al., 2024; Courcoulas, 2013). Research using longitudinal methods shows a similar pattern. For example, Voorwinde et al. (2022) found five different weight-loss groups across five years, but most patients followed a fairly steady and common pattern during the first year before their paths started to differ later on. Together, these studies reinforce that the first postoperative year typically follows a stable and consistent pattern of weight loss. Interestingly, how much weight patients had lost by the first month was not related to how much they lost in later months. This means that early postoperative outcomes may not be reliable indicators of how the rest of the year will unfold.

When the biopsychosocial profiles were incorporated into the growth curve model, class membership did not predict differences in the trajectory of weight loss over the year. Despite entering surgery with very different combinations of physical comorbidities, psychosocial

distress, and social support, patients in one class did not show meaningfully different weight-loss patterns than those in another class. This suggests that the preoperative differences captured in the latent classes did not translate into differences in the trajectory of weight loss during the first year. Recent research further supports these findings. In a large prospective study using growth mixture modeling, three distinct weight-loss trajectories across the first three postoperative years were identified (Slurink et al., 2024). The study also found that none of the psychological factors measured before surgery were associated with the weight-loss path patients followed. Rather than predicting early weight loss, preoperative biopsychosocial profiles may be better suited to differentiating patients on outcomes related to adherence, engagement in care, mental health trajectories, and longer-term weight maintenance.

Importantly, the profiles still provide insight into patterns of physical health comorbidities, mental health needs, and perceived social support at the time of surgery, including variability in support from family members or partners. While these differences did not shape early weight loss, they may be highly relevant for other important outcomes, such as adherence to pre- and postoperative recommendations, engagement in follow-up care, quality of life, and longer-term weight maintenance. In particular, differences in family or relational support may influence patients' ability to manage the daily demands of recovery and sustain health-promoting behaviors once structured care diminishes. Identifying distinct profiles, therefore, represents an important first step toward developing biopsychosocial supports and interventions that are better matched to patients' specific medical, psychological, and relational needs.

A possible explanation is that the combination of surgical effects and early postoperative structure reduces individual differences in the first year. From a biopsychosocial perspective, the early phase of recovery is shaped by several common influences, including the biological impact

of surgery, the body's natural healing response, and the standardized structure of postoperative care (Courcoulas, 2013; van Baak & Mariman, 2023; Boustani et al., 2024). Although the pace of healing can vary somewhat across individuals, the immediate physiological shifts that follow surgery (appetite regulation, digestion, and energy balance) tend to occur for most patients. At the same time, patients follow a similar diet to one another, have a regular follow-up schedule, and behavioral guidelines during the first year (Brethauer et al., 2015; ASMBS, 2021; Sarwer & Heinberg, 2020). These shared factors of biological and postsurgical care can act as a short-term leveling force, making early weight-loss patterns look similar across classes despite different baseline risks and resources.

The observed pattern of steady weight loss across the first postoperative year seen in the growth curve is consistent with the idea that shared biological changes and standardized postoperative care constrain individual differences during this period. Importantly, early weight loss at one month was not associated with the rate of subsequent weight change over the remainder of the year, suggesting that early postoperative outcomes may not be reliable indicators of longer-term trajectories. Similar patterns have been observed in prior longitudinal research, in which most patients followed comparable weight-loss paths during the first postoperative year before diverging later (Courcoulas, 2013; Voorwinde et al., 2022). As a result, the first postoperative year may not be the optimal timeframe for identifying the influence of preoperative biopsychosocial differences on weight-loss trajectories. As postoperative routines become less prescriptive in later years, day-to-day health behaviors, coping strategies, stress management, and reliance on social support may play a larger role in shaping outcomes, allowing biopsychosocial factors greater influence on weight-loss patterns (Slurink et al., 2024). In this context, the three profiles may represent different domains of risk that are temporarily

muted during the structured early postoperative period. Accordingly, examining whether these profiles prospectively predict divergence in weight-loss trajectories beyond the first postoperative year represents an important direction for future research.

Limitations

Several limitations should be considered when interpreting the findings from this study. First, the study relied on secondary analysis of clinical records, which limited control over how variables were originally conceptualized, collected, and documented. As a result, the dataset did not include indicators of social determinants of health (SDoH), such as socioeconomic resources, neighborhood environment, food access, employment demands, transportation reliability, or insurance stability. These factors may meaningfully shape both psychosocial functioning and postoperative outcomes. For example, limited access to affordable, nutritious food or safe spaces for physical activity may hinder adherence to postoperative dietary and activity recommendations, while unstable employment schedules, financial strain, or unreliable transportation may interfere with follow-up appointments and engagement in ongoing care.

More broadly, SDoH may also influence mental health trajectories alongside weight loss outcomes. Chronic stressors related to financial insecurity, housing instability, caregiving demands, or exposure to weight stigma may contribute to symptoms of depression or anxiety that complicate behavioral adjustment following surgery. Because these factors were not included in the dataset, the findings cannot fully reflect the broader social and structural conditions that influence patients' weight loss and mental health over time.

Although this study was guided by a biopsychosocial framework, the findings also highlight limitations of this model when applied without explicit attention to SDoH. While the biopsychosocial model is valuable for integrating biological, psychological, and interpersonal

factors, it has been criticized for insufficiently accounting for social and economic forces that shape access to care, exposure to chronic stress, and opportunities for sustained behavior change. As a result, biopsychosocial profiles may reflect not only individual challenges but also broader social and structural barriers that were not measured in this study.

An additional limitation involves potential selection bias introduced by the study's inclusion criteria. To be included in the analytic sample, patients were required to proceed with MBS and to have available postoperative follow-up data, which necessarily excluded individuals who completed the preoperative psychological evaluation but did not move forward with surgery or did not attend follow-up visits. These excluded patients may differ from those included in the sample, particularly with respect to medical complexity, psychosocial distress, logistical barriers, or access to resources that affect healthcare engagement. For example, patients experiencing greater psychosocial instability, limited transportation, competing caregiving or employment demands, or lower perceived support may be less likely to attend postoperative follow-up appointments and thus underrepresented in the present analyses. In addition, patients who reported a cancer diagnosis prior to surgery were excluded from the sample, as bariatric surgery candidates with active or prior cancer often undergo a substantively different evaluation, timing, and treatment decision-making process that may influence both psychosocial presentation and postoperative outcomes. As a result, the findings may primarily reflect the experiences of patients who were able to engage in surgical care and postoperative follow-up within the standard bariatric pathway and may underestimate the degree of psychosocial barriers present in the broader population of bariatric surgery candidates.

The study also examined weight loss outcomes only during the first postoperative year, a period largely driven by the physiological effects of surgery and a highly structured clinical care

routine. As such, the findings may not extend to longer-term outcomes, such as weight regain, changes in eating behavior, quality of life, or evolving mental health trajectories, which are more strongly influenced by environmental conditions and social context. Additionally, perceived social support was assessed using a single dichotomous indicator, which cannot capture variability in support quality, consistency, or relational strain.

Third, the dataset did not include information regarding medication use**,** including both psychotropic medications (e.g., antidepressants, antipsychotics, mood stabilizers) and medications prescribed for physical health conditions (e.g., diabetes, hypertension, chronic pain). Medication use may influence appetite regulation, metabolic functioning, energy levels, and mood, and thus represents an important unmeasured factor that could affect postoperative weight loss and psychological adjustment. Because medication use was not measured, it is difficult to tell whether weight outcomes were influenced by psychosocial factors or by medications.

Finally, mental health diagnoses documented in the medical record may underestimate true prevalence, as patients may underreport or withhold information due to concerns that disclosure could delay surgical approval. Together, these limitations underscore the importance of future research that integrates detailed assessments of social determinants of health and medication use alongside psychosocial factors, follows patients longitudinally beyond the early postoperative period, and applies theoretical frameworks that explicitly incorporate structural context to better understand variability in bariatric outcomes.

Future Research

Future research should build on the present study by examining weight loss trajectories beyond the first postoperative year. Long-term follow-up is essential for understanding when and how biopsychosocial factors begin to meaningfully shape outcomes once the initial physiological

effects of surgery and the highly structured care environment diminish. Because early postoperative weight loss is largely driven by shared biological or physiological effects of surgery, future research should examine whether the identified profiles predict longer-term outcomes such as weight maintenance, weight regain, adherence to postoperative recommendations, mental health trajectories, and changes in quality of life. Tracking patients beyond the first year may reveal more pronounced differences across subgroups and clarify the role of psychological and social resources in sustaining long-term progress.

In addition, future studies should more fully integrate SDoH to understand biopsychosocial profiles within patients' lived environments. Collecting information on factors such as socioeconomic resources, employment demands, food access, neighborhood safety, transportation reliability, insurance stability, and caregiving responsibilities may help explain variability in both weight loss and mental health outcomes that cannot be attributed to individual psychosocial factors alone. These structural conditions likely shape patients' ability to adhere to postoperative recommendations, attend follow-up appointments, and sustain behavioral changes over time. Incorporating SDoH frameworks alongside biopsychosocial assessments may therefore provide a more complete understanding of recovery processes following bariatric surgery.

The unexpected finding that many partnered patients did not report feeling supported during the surgical process further underscores the need to move beyond structural indicators of social relationships and examine support as a relational and contextual process. Future research should assess not only the presence of partners or family members, but also the quality, stability, and perceived reliability of support within relationships, as well as how relational dynamics interact with broader social stressors. Understanding how social support and environmental

factors influence each other may help identify patients who are at risk despite appearing socially connected.

Finally, expanding this work across diverse bariatric programs and healthcare settings would strengthen generalizability. Patient demographics, preoperative evaluation practices, cultural norms, and available postoperative supports vary widely across programs and regions. Replicating the latent profile approach in larger and more diverse samples, while integrating detailed measures of social determinants of health, would help determine whether the profiles identified in this study are robust across contexts or whether distinct subgroups emerge based on structural and environmental differences. Such research would advance a more comprehensive and equity-informed understanding of bariatric recovery and could inform the development of targeted interventions that address not only psychosocial needs, but also the social and structural conditions that shape long-term success.

Clinical Implications

The findings of this study have important implications for preoperative assessment and care planning in metabolic and bariatric surgery. Although the biopsychosocial profiles did not predict weight-loss trajectories during the first postoperative year, they revealed important differences in physical comorbidity, psychiatric diagnoses, mental health treatment engagement, and perceived social support at the time of surgery. These factors remain clinically relevant even when early weight outcomes look similar across patients.

Consistent with prior research, the absence of early weight-loss differences across psychosocial profiles suggests that preoperative psychological characteristics should not be interpreted as predictors of early surgical success or failure (Fisher et al., 2017; Kiser et al., 2023a; Kiser et al., 2023b). Instead, the findings reinforce the role of the preoperative

psychological evaluation as a tool for identifying psychosocial risk and informing individualized preparation and follow-up. This interpretation aligns with work demonstrating that patients with psychiatric diagnoses often achieve comparable early weight loss, despite differences in psychological complexity and care needs (Dawes et al., 2016; Sarwer & Heinberg, 2020).

Similar early weight-loss patterns across biopsychosocial profiles suggest that psychosocial risk does not limit the body's initial response to surgery. During the first postoperative year, shared biological changes and standardized care tend to produce similar weight-loss patterns across patients (Courcoulas, 2013; Boustani et al., 2024). Prior longitudinal research indicates that variability in outcomes often emerges later, once the structured postoperative environment diminishes and behavioral, psychological, and social factors become more influential (Voorwinde et al., 2022; Slurink et al., 2024). From a preoperative perspective, this underscores the importance of viewing biopsychosocial profiles as indicators of care needs rather than as predictors of early outcomes.

The findings further highlight the importance of directly assessing perceived social support prior to surgery. Nearly half of partnered patients in the low-support profile reported not having someone they perceived as supporting them through the surgical process, underscoring that relationship status alone is an imperfect proxy for meaningful support. This aligns with prior work showing that spousal or romantic partnerships may range from supportive to neutral or even obstructive in the context of bariatric care, and that patients' perceptions of support are central to motivation and adherence (Ferriby et al., 2015; Pratt et al., 2016; Albright et al., 2020). Accordingly, the high prevalence of low perceived support among partnered patients underscores a key role for social workers and care coordinators in preoperative care, particularly in assessing

who will assist with recovery demands and identifying gaps in instrumental or emotional support that may affect engagement and follow-up.

These patterns also have implications for how different members of the bariatric care team use preoperative information. For mental health providers, differences in psychiatric diagnoses and treatment engagement support a focus on evaluating symptom stability or severity, current treatment involvement, and psychosocial readiness rather than anticipating early weight outcomes (Kiser et al., 2023a; Fisher et al., 2017). Preoperative planning for patients with higher psychiatric comorbidities may therefore involve clarifying expectations for follow-up care, identifying potential stressors during recovery, and coordinating continuity of mental health services. Registered dietitians and physical therapists/trainers can similarly use preoperative profiles to inform assessment rather than prediction, recognizing that early weight loss is largely shaped by shared biological effects of surgery and structured care pathways (Courcoulas, 2013; Boustani et al., 2024). In this context, preoperative nutrition and movement consultations may prioritize identifying practical constraints related to physical comorbidities, household routines, or support availability, rather than assuming patient adherence based on early outcomes.

Conclusion

This study examined how physical comorbidities, psychological symptomology, and psychosocial supports group together among patients seeking metabolic and bariatric surgery and whether these biopsychosocial profiles predicted early postoperative weight-loss trajectories. Using latent profile analysis, three distinct patient groups emerged that differed meaningfully in their levels of physical comorbidities, psychological symptomology, and psychosocial supports. However, these profiles did not predict differences in %TWL during the first postoperative year. Several findings carry important clinical value, particularly the unexpected pattern that many

partnered patients reported feeling unsupported during the surgery process. This finding underscores the need to assess perceived support directly rather than assuming it based on relationship status. Although the first year may be shaped largely by shared physiological and structured care routines, biopsychosocial differences are likely to become more influential as patients move beyond this structured period. Collectively, the findings highlight the importance of viewing surgical outcomes within a holistic biopsychosocial framework and underscore the value of integrating physical, psychological, and psychosocial supports to better meet the diverse needs of bariatric patients.

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