

# Preoperative psychological assessment of patients seeking weight-loss surgery: identifying challenges and solutions

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**Abstract:** Preoperative psychosocial assessment is the standard of care for patients seeking weight-loss surgery (WLS). However, the assessment procedure varies widely by surgery site. Comprehensive assessments can provide a wealth of information that assists both the patient and the treatment team, anticipate and prepare for challenges associated with extensive behavioral and lifestyle changes that are required postsurgery. In this review, we provide an overview of the purpose of the preoperative psychosocial assessment and domains to be included. Challenges commonly identified in the assessment are discussed, including maladaptive eating behaviors, psychiatric comorbidities, and alcohol use. Potential solutions and approaches to these challenges are provided. Additionally, patient populations requiring special consideration are presented to include adolescents, those with cognitive vulnerabilities, and aging adults.

**Keywords:** bariatric surgery, preoperative assessment, weight-loss surgery, challenges, adolescents, older adults, cognitive impairment, maladaptive eating, alcohol misuse

## Introduction

Preoperative psychosocial assessment has become the standard of care for 90% of centers offering weight-loss surgery (WLS).<sup>1,2</sup> A psychosocial-behavioral evaluation is required for metabolic and bariatric surgery centers to be nationally accredited by the American College of Surgeons and the American Society for Metabolic and Bariatric Surgery as providing optimal patient care.<sup>3</sup> A psychosocial evaluation is also endorsed in the 2013 update for clinical practice guidelines for the preoperative nutritional, metabolic, and nonsurgical support of the bariatric patient.<sup>4</sup> Also, managed care providers require a psychosocial evaluation by a mental health professional prior to granting financial approval for WLS.

The growing emphasis placed on preoperative psychosocial assessment is not without due cause. Obesity is increasingly conceptualized and accepted as a chronic disease course caused by a complex interplay of genetic, behavioral, environmental, and physiological variables.<sup>5</sup> At the very minimum, preoperative psychosocial assessments are used to identify possible contraindications for surgery, such as uncontrolled substance abuse or mental illness.<sup>4</sup> However, more comprehensive evaluations provide a wealth of information that can be used to inform treatment planning and promote improved quality of life and positive weight-loss outcomes. Comprehensive preoperative assessment provides the opportunity to identify a given patient's strengths and areas of vulnerability with regard to their weight-loss goals. Potential postsurgical psychosocial difficulties can be identified, and a plan can be collaboratively established to be utilized when

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difficulties arise.<sup>6-10</sup> Information derived from psychosocial assessments can also be used to improve providers' understanding of patients' unique challenges and circumstances, leading to increased provider empathy and opportunity for an individualized health care plan.

Importantly, while there are published recommendations regarding the structure and content of psychosocial evaluations, consensus guidelines have not been established.<sup>10-12</sup> The 2013 clinical practice guidelines provide vague recommendations, including assessment of "environmental, familial, and behavioral factors of all patients before surgery" and of patients' "ability to incorporate nutritional and behavioral changes before and after surgery".<sup>4</sup> The lack of clear, published guidelines has led to significant diversity in the depth and breadth of psychosocial assessment across centers. This inconsistency across centers is a challenge that precludes a standardized continuum of care for patients.<sup>3</sup> Further, patients fail to receive a cohesive message regarding the importance and impact of psychosocial variables in the surgical treatment of obesity.

While considerable variability exists in the content of pre-WLS psychosocial assessments across centers, comprehensive evaluations typically gather information via a clinical interview and administration of self-report forms.<sup>1,8,13-15</sup> Commonly assessed domains include psychiatric adjustment, neurocognitive functioning, attitudes and surgical knowledge, expectations for outcomes, health behaviors and adherence, level of social support, coping and stress management, and postsurgical planning.<sup>6,11,16</sup> The value of more detailed assessment within these domains is well documented in the literature, and provides a foundation for the development of comprehensive assessment practices.<sup>6-10</sup> As the field moves away from using psychological evaluations simply as a screening process, the utility of the assessment for intervention can be more fully employed. Sogg and Mori<sup>17</sup> discuss a number of ways in which the preoperative evaluation can generate opportunities to enhance surgical outcome through psychosocial intervention.

Importantly, surgical interventions for weight loss have become more widely available and well established over the past 2 decades.<sup>18,19</sup> This growth has resulted in increased access to and utilization of surgical interventions for obesity treatment.<sup>20</sup> While this growth affirms the importance of following recommended practices in assessing psychosocial functioning, it has also resulted in greater diversity in the presentation of patients seeking WLS. It is increasingly imperative that providers become adept at recognizing the unique challenges that can arise in the preoperative assessment and

the need for creative, diversified treatment solutions. The purpose of this paper is to highlight many commonly identified challenges associated with preoperative assessment and treatment and evidence-based approaches for addressing these challenges. Additionally, we present emerging challenges associated with an increasingly diverse WLS-seeking population and treatment opportunities that have received relatively less attention in the literature.

## Maladaptive eating behaviors

Obesity is associated with a variety of maladaptive eating behaviors, including irregular eating, skipping breakfast, eating large portions, night eating, grazing, emotional eating, and binge eating. Any number of these maladaptive eating behaviors may be present in patients seeking WLS.<sup>21,22</sup> In addition to being associated with obesity, these behaviors are incompatible with recommended postsurgery dietary behaviors. They are associated with poorer surgical outcomes, including suboptimal weight loss and weight regain, and can contribute to unpleasant side effects, including dumping syndrome and overfeeding.<sup>23,24</sup> Emotional eating, grazing, and night eating can be particularly problematic for postsurgical patients, because they allow the patient to eat around the surgical restriction that is in place.<sup>25</sup> While one might argue that patients with eating pathologies be screened out for WLS, these behaviors are extremely common in this WLS-seeking population. Further, presurgical eating behaviors are inconsistent predictors for postsurgical outcome. Some studies have demonstrated positive surgical outcomes in patients with even the more extreme maladaptive eating behaviors, such as binge eating.<sup>26,27</sup> One study found improved outcomes postoperatively in patients who reported preoperative emotional eating.<sup>28</sup>

Another complicating factor has been the lack of clear and established diagnostic criteria for binge-eating disorder. While the disorder has been observed and treated in the clinical arena for many years, it has only recently been formally given a diagnostic place in the *Diagnostic and Statistical Manual of Mental Disorders* fifth edition.<sup>29</sup> Diagnostic clarification may allow for more rigorous examination of the disorder, particularly within the obese and surgery-seeking population.

Regardless of preoperative eating behaviors, the development of healthy eating patterns postoperatively is critical for long-term success. Patients are faced with the task of learning and implementing new dietary behaviors after bariatric surgery. Current and past eating behaviors are an important area of assessment in the presurgical evaluation. A detailed

assessment helps to identify the specific eating patterns that are maladaptive, expectations about the impact of the surgery on eating behaviors, willingness and motivation to adopt new eating behaviors, and behavioral strategies that have been tried. In addition, it is important to determine what motivates eating. Patients may be differentially susceptible to social cues, emotional cues, environmental cues, or cravings to satisfy hedonic pleasure. This kind of detailed assessment enables an individualized plan for behavioral intervention.

Evaluating eating behaviors may elicit a significant emotional response from patients. They may feel that they are being judged by the examiner for their eating habits. This may be a longstanding fear of feeling judged by others, due to their weight being associated with stigmatization. Patients may feel the need to minimize or justify their maladaptive eating patterns for fear of being deemed inappropriate for WLS. Or they may have an inaccurate view of their own eating behaviors. They may not appreciate the ways in which their current eating behaviors are problematic, and may have normalized maladaptive behavior.

## Solutions

Obtaining an objective behavioral sample of eating behavior is a critical component of the presurgical evaluation. This can be obtained in a variety of ways. A simple method is to gather a 24-hour food recall during the clinical interview. Patients can be encouraged to keep a food journal in order to increase their awareness of their eating habits and provide a more objective record for the medical team. A variety of electronic monitoring devices are available to assist in tracking food- and activity-related behaviors. Many patients may prefer to use these mobile electronic tools over traditional paper-and-pencil tracking methods. Further, self-monitoring is an effective tool in and of itself for behavior change. Regular monitoring of food intake and weight has been associated with long-term weight maintenance in behavioral weight-management programs.<sup>30</sup>

Based on the individual eating pattern identified in the presurgical assessment, patients can be provided with specific psychoeducation related to the metabolic and emotional impact of their eating behaviors. For example, a patient who frequently skips meals may benefit from information related to the metabolic slowing and excess energy storage that can result from this behavior. Further, the individual may resonate with common emotional ramifications of skipping meals, such as a sense of deprivation and extreme hunger leading to increased vulnerability to overconsumption of energy-dense foods. Most importantly, specific behavioral recommenda-

tions can be created. Common strategies include the use of stimulus control to reduce exposure to highly desirable foods, increased access to nutritionally dense foods, and portion-control measures. Patients can be encouraged to develop other pleasurable activities in response to emotional cues, as well as alternative ways to connect socially. Patients can also be encouraged to use a schedule for eating to reduce both skipping meals and grazing.

The development of specific behavioral recommendations for improving eating patterns is an essential component of the presurgical assessment. This communicates to both the patient and the treatment team areas for improvement and behavioral strategies to achieve improvement. These goals and strategies can then be monitored in subsequent visits by any member of the treatment team.

Recent efforts in the field of obesity and maladaptive eating have focused on the role of acceptance-based skills in weight control. Forman and Butryn<sup>31</sup> proposed a model of weight control in which internal and external cues are moderated by individual factors, such as disinhibition, responsivity to food, and mood disturbance, each of which interacts with self-regulation skills, such as behaviorally committed action associated with identified values, self-awareness, and distress tolerance. These acceptance-based skills increase the patient's ability to tolerate unpleasant internal thoughts, feelings, and sensations, and persist in adaptive behavior that is consistent with identified values and goals.

Given the complex nature of eating behavior, difficulty with environmental control strategies in our obesogenic food environment, and neurophysiological reward systems for food, an acceptance-based approach that acts to develop tolerance for internal experiences is quite promising. Care can be taken during the presurgical evaluation to help patients clarify their values in terms of weight loss and begin to prepare them to cope with continued food cravings and desires while persisting in value-oriented behavior postsurgery.

## Psychiatric comorbidities

Psychiatric comorbidities are common among individuals seeking WLS. However, in patients' attempts to present themselves favorably, it is not uncommon for them to minimize self-reported psychiatric symptoms. This minimization complicates obtaining accurate incidence rates of psychiatric comorbidities within the WLS population.<sup>32</sup> Patients' motivation to present favorably also creates a significant challenge for accurate assessment of psychiatric functioning during psychosocial evaluations.<sup>33</sup> Nonetheless, findings from the literature suggest a high prevalence of psychiatric disorders

among patients seeking WLS. In a recent study designed to minimize favorable self-presentation, 34% of patients seeking WLS had at least one current Axis I disorder and approximately 70% had at least one lifetime disorder. Approximately 40% had a lifetime history of major depressive disorder. These statistics are significantly higher than population-based prevalence rates for these conditions.<sup>32</sup> Anxiety diagnoses have been documented in up to 48% of patients seeking WLS and identified as the most common psychiatric condition present at the time of the presurgical psychosocial evaluation.<sup>34–38</sup>

Furthermore, patients who struggle with psychiatric symptoms, particularly mood symptoms, such as depression and anxiety, are likely to attribute these symptoms to their current weight status. In fact, this may be a primary motivator for some patients to seek WLS. However, it may minimize their motivation to participate in preoperative treatment recommendations that could delay surgical intervention, such as counseling or psychopharmacological intervention. Findings from the literature do not confirm patients' commonly held belief that WLS will lead to the resolution of psychiatric symptoms. Some studies have documented improvement of psychiatric symptoms post-WLS,<sup>39–43</sup> while other findings have highlighted the resilient nature of mood symptoms following WLS.<sup>36,37,44,45</sup> Other research suggests recurrence of psychopathology in the postoperative period, with reemergence of symptoms 2–3 or more years after surgery.<sup>46,47</sup> Regardless of resolution of symptoms, untreated preoperative psychiatric symptoms and disordered eating behaviors, specifically binge eating, have been associated with weight regain and suboptimal weight loss following surgery.<sup>37,48–52</sup> These findings highlight the importance of presurgical assessment and treatment of psychiatric conditions to improve quality of life and successful surgical outcomes.

Lastly, psychiatric assessment and treatment targeted at optimizing presurgical functioning may serve as a protective factor for mood fluctuations or the “emotional rollercoaster” that is commonly reported by patients in the first 1–2 years following surgery.<sup>39,53–55</sup> While emotional variability has not been systematically examined during the early postoperative period, social variables likely play a significant role in the onset of new emotional symptoms. Emerging evidence related to the gut–microbiota–brain (GMB) axis supports the possibility that emotional symptoms occur as a result of neurophysiological and hormonal changes caused by surgery.<sup>56</sup>

## Solutions

There are few to no recommendations in the literature for strategies to limit patients' minimization of psychiatric

symptoms during psychosocial evaluations for WLS. However, thorough assessment seems to be crucial in order to capture fully the patient's psychiatric history and current functioning. More specifically, use of both the clinical interview and psychometric instruments to collect clinically relevant data is warranted, particularly use of assessment measures that include validity scales. Structured diagnostic interviews have been identified as the state-of-the-art method for rigorous and accurate assessment of psychopathology.<sup>32</sup> Further, asking questions related to psychiatric functioning at various points in the preoperative process and using various approaches is likely to minimize communication misunderstandings and provide the opportunity for inconsistencies in self-reporting to be revealed.

Patients with poorly controlled psychiatric symptoms prior to WLS are at increased risk of weight regain and suboptimal weight loss.<sup>57,58</sup> Therefore, adequate treatment is imperative. The gold standard for psychiatric treatment is a combination of psychotherapy and psychopharmacological intervention.<sup>59</sup> Referrals for both treatments are recommended when clinically indicated. Inspiring patients to comply with these treatment recommendations is often challenging, as patients are likely to view requirements for psychiatric treatment as a barrier to achieving their goal of undergoing WLS. Intrinsic motivation to comply with this recommendation may be engendered via cognitive reframing strategies that highlight the patient's ultimate goal of successful weight loss and weight-loss maintenance, as opposed to merely undergoing WLS. Similarly, psychoeducation related to the negative impact of uncontrolled psychiatric conditions and suboptimal weight-loss outcomes is likely to increase motivation to participate in a plan for achieving the reframed goal. Committed participation in counseling and successful psychiatric outcomes have consistently been linked to the establishment of a strong therapeutic relationship.<sup>60</sup> Therefore, assuming that positive therapeutic rapport has been established during the psychosocial interview, patients may be more likely to comply with counseling recommendations if they are given the opportunity to receive counseling from the provider who conducts their assessment. Opportunities that offer continuity of care and foster a sense of being cared for by a treatment team are also likely to inspire patients' adherence to psychiatric recommendations.

Emerging opportunities for treatment include multiple new pharmacological treatments that have been approved by the US Food and Drug Administration for the treatment of disordered eating behaviors. Lisdexamfetamine dimesylate has been demonstrated to limit impulsive eating behaviors,

and was recently approved for the treatment of binge-eating disorder. Similarly, bupropion/naltrexone can be effective in minimizing intrusive food-related thoughts that can lead to anxiety and binge-eating behaviors. Naltrexone can be used in support of treating alcohol-use disorders. Other treatment options are phentermine and topiramate, which can be used in combination or separately for appetite and craving suppression. Lorcaserin can be used in support of portion control, as it promotes early satiation. Patients who report relevant symptoms during the psychosocial assessment should be referred for consideration of these treatment options to primary care providers or internists.

While research related to the GMB axis is in its early stages, future findings could hold important implications for pre- and postoperative management of psychiatric conditions. Use of what have recently been coined “psychobiotics”, or therapeutic modulation of gut microbiota, may be crucial in treating disturbances of the GMB axis, including psychiatric disorders. Although evidence is modest, pre- and probiotics may be used for mood management in the future.<sup>56,61</sup>

## Alcohol use/misuse

Current substance abuse tends to have a lower prevalence rate in a bariatric surgery-seeking population than the general population.<sup>48</sup> It is possible that food is the addiction of choice, and thus substance abuse is less common. However, an area of increasing concern is the development of alcohol misuse in post-WLS patients. While patients with a history of substance abuse/misuse have been identified as at risk for substance misuse postsurgery, research has somewhat surprisingly identified an increased risk for new alcohol-use disorder post-WLS.<sup>62,63</sup> Changes occur in how alcohol is metabolized following WLS. Both the time to maximum concentration and the length of time to eliminate alcohol are altered. This creates a dual effect of individuals experiencing the intoxicating effects of alcohol more quickly and of increased duration of intoxication. Additional risks include nonnutritive calories added to the diet, alcohol sugars that may produce dumping syndrome, and in the case of beer or sparkling wine the presence of carbonation that is discouraged postsurgery. Other possible ramifications of alcohol use post-WLS include vitamin deficiencies, dehydration, and impulsive eating behaviors.

## Solutions

Recent recommendations call for patients to be warned about the increased risk of developing an alcohol-use disorder post-WLS as part of informed consent and discussing the

potential risks and benefits of the procedure.<sup>45</sup> Patients should be provided clear information about the changes in their physiologic response to alcohol, and provided with clear behavioral guidelines to include caution in operating a motor vehicle. For example, patients who may be accustomed to tolerating one drink per hour may no longer be safe to drive within that period of time. Patients may be best advised to avoid all alcohol post-WLS.

For patients who have a history of alcohol problems, continued sobriety may be particularly prudent, as well as continuing strategies that maintain sobriety. Patients with current alcohol-use problems should delay surgery until the substance-use problem is addressed. It may be useful for patients to agree to current and future toxicology-screening tests as part of the treatment plan. Heinberg et al<sup>64</sup> provide useful recommendations for both evaluating and treating preoperative WLS patients to include initial screening, assessment, psychoeducation, and informed consent.

## Challenges in specific populations Adolescents

Obesity is not an adult-only problem. Adolescent obesity has increased significantly, affecting 20.5% of the US population aged 12–19 years.<sup>65</sup> Increasingly, WLS is seen as a treatment option for adolescents with severe obesity.<sup>66</sup> There is increasing support for WLS as part of a larger continuum of care options for obesity, with WLS recommended for patients who meet a variety of criteria to include medical comorbidities, body mass index  $\geq 95\%$  of the sex-specific body mass index-for-age growth charts, and failed behavioral weight-loss efforts. Similarly to adults, a comprehensive, multidisciplinary approach is necessary in evaluating appropriateness and readiness for WLS. However, the adolescent population requires special consideration of a number of factors.

Social stigma is prevalent in obesity, affecting all ages. However, adolescence is a time of peer-focused social development. The adolescent is particularly vulnerable to the effects of social stigma during this time of increased need for belonging and identity development that occurs within the context of social functioning. Weight-related teasing or bullying can have a profound effect on the adolescent. Studies have shown increased rates of depression among youth with obesity, particularly females.<sup>67</sup> In addition to emotional functioning, social stigma may affect inclusion in activities or groups. This may impede the development of other skills and abilities, which can lead to reduced performance in areas where one might otherwise excel. These become lost opportunities of development. At its worst, social stigma can set

in motion a developmental trajectory of distress, disability, and reduced productivity.

As part of the social context, the family environment plays a critical role in the adolescent patient's life, and requires special consideration. There may be a number of motivating factors that propel the adolescent to seek WLS. Some of these factors may in fact come from parental or caregiver concerns related to the adolescent's health and well-being. However, there may be factors within the family environment that are contributing to or reinforcing weight gain. These might include such factors as food habits in the home, food selection and availability, and family norms related to eating behaviors. Adolescents within a family practicing an unhealthy eating pattern have increased difficulty developing healthy eating habits and making healthy food choices. Studies have repeatedly demonstrated the influence of the environment on food choices,<sup>68,69</sup> and the home is a critical sphere of influence. In addition, adolescents often have limited ability to change the home environment without the support of parents or other caregivers.

While parents may be motivated for their adolescent to have WLS due to health concerns, adolescents themselves may be more motivated by body image and social concerns. Adolescents may have unrealistic expectations about how their bodies will appear after surgery, and may not be prepared for loose, excess skin, scars, or other perceived imperfections. This may result in continued discomfort with their bodies.

Finally, adolescence is a time of emancipation and growing independence. Adherence to health care recommendations is a well-recognized and documented challenge with adolescents,<sup>70,71</sup> and is often accompanied by rule and authority testing. Health care providers fall into the role of authority figures, and health care recommendations are susceptible to being viewed as rules. Further, adolescents may resist recommendations that single them out from their peers or interfere with normative peer activities. This might include adhering to dietary guidelines, such as packing a lunch for school or avoiding fast-food restaurants. Adolescents are asked to make widespread changes to their eating, leisure, and lifestyle activities after WLS. While these changes are challenging for motivated adults to achieve, adolescents may find these changes particularly restrictive and life-interfering. In relation to this, adolescents may be particularly vulnerable to problems with substance misuse and the development of alcohol-use disorders. Adolescence and young adulthood are often a time of experimentation with substances, as well as a peer culture that encourages and normalizes substance misuse.

## Solutions

Adolescent patients require adolescent-specific comprehensive psychosocial evaluations. While many of the same domains as adult patients need to be evaluated, they need to be adapted to the adolescent patient. Additional emphasis is required in a number of areas, including the social and family environment. Austin et al provide a useful review of the comprehensive presurgical psychological assessment of adolescents.<sup>72</sup>

In the provision of surgical treatment for adolescents with obesity, it is critical that the social context in which adolescents live be assessed, including the effect of social stigma on their lives and their social/emotional developmental maturity. While weight loss is the primary goal of WLS, it is important to address the associated psychosocial aspects of weight loss and develop additional goals consistent with social and identity development. This might include learning new skills and exploring new activities. Patients can be encouraged to pursue developmentally appropriate tasks, such as pursuing a driver's license and developing independent living skills. The overarching goal is to help the patient utilize WLS as an opportunity to increase participation in developmentally appropriate activities that further social and emotional development. This can lead to enhanced functioning and productivity that can also impact self-image. This approach can also guard against body-image dissatisfaction that may persist after surgery. Patients can be encouraged through their own social and identity development to view themselves from a broader perspective that includes their unique skills, abilities, and interests.

The family food environment can be a particularly challenging arena of intervention. While family members may agree that food habits need improvement, these habits may be particularly ingrained and resistant to change. Creative solutions involving the patient and family members are needed to set up an environment of success. This includes creating distance between problem foods and the patient, such as removing these foods from the patient's bedroom and if possible the house. They can then be replaced with healthy food items. If unhealthy foods are brought into the home by other family members, they can be stored in personal areas of the home rather than communal areas, such as the kitchen. Other interventions include finding new ways to spend time together that are not eating-based and alternate ways to celebrate occasions and accomplishments. Activity-oriented alternatives may be particularly beneficial. In addition to the significant influence of the home environment, it is important for the patient to recognize the impact of the obesogenic

environment on food choices and develop ways to make healthy choices within this environment.

Similarly, adolescent patients need to be engaged in their own health behaviors. Adolescents will often resist if they are being told what to do, but if asked may be able to largely participate in solutions for postoperative health behaviors. Health behaviors can be connected with patient values and goals, which are much more likely to be immediate and meaningful to the patient. This is likely to improve both short- and longer-term adherence to dietary recommendations. Peer social support may be particularly effective at helping to increase health behaviors, such as using a buddy system for exercise. Adolescent patients can be paired with other adolescents who are pursuing similar goals.

### Cognitive vulnerabilities

With WLS becoming increasingly available as a treatment option for all individuals with obesity, a more diverse patient population has emerged that may present challenges for the preoperative psychological assessment.<sup>18,20</sup> One of these challenges is identifying patients seeking WLS who present with cognitive vulnerabilities. A variety of patients may fall into this category, including adolescent patients, aging patients, and patients with low IQs, learning disorders, or a history of low educational achievement. There are many avenues by which cognitive limitations could negatively impact postsurgical outcomes. Difficulty consolidating information could prevent important information related to the surgical procedure and necessary lifestyle changes from being retained by the presurgical patient. Memory difficulties could interfere with a patient's ability to recall recommendations related to healing, wound care, graduated food intake, or vitamin regime, resulting in increased risk for an adverse event and suboptimal weight loss. Limited literacy and educational achievement could limit patients' ability to utilize educational materials and self-monitoring strategies. Executive dysfunction could interfere with a host of higher-order skills, such as a patient's ability to implement and execute an organized plan, problem-solve, or predict the consequences of his or her behavior. Of particular concern is the presence of disinhibition, as disinhibited responses have been associated with binge-eating behaviors and weight regain.<sup>73-75</sup>

Further, it is possible that neurological profiles, beyond localized deficits due to neurodegeneration or injury, could increase risk for poor surgical outcomes. For example, individuals who are more behaviorally impulsive, have a propensity to hyperfocus (ie, on food), or who have stronger hedonic neurophysiological reward responses may be

at higher risk for maladaptive eating behaviors and poorer surgical outcomes.<sup>76</sup> Additional research is needed to determine the possible benefit of neurological profiling for bariatric surgery candidacy.

Lastly, findings related to brain development over the past decade have shed new light on "adulthood" from a neurological perspective. Brain development is not fully complete until an individual is in their mid-twenties.<sup>77,78</sup> The frontal lobes, crucial to executive functioning, are the last lobes of the brain to develop. While this accounts for the impulsive, risk-taking behavior that often occurs in adolescence and young adulthood, questions remain regarding when adolescents are cognitively prepared to follow through with the recommendations required for success following WLS, and whether WLS should be delayed until brain development is complete.

### Solutions

Fortunately, many cognitive limitations can be compensated for via identification of personal strengths and activation of resources. If neurocognitive deficits are profound, a comprehensive neuropsychological assessment that identifies the individual's relative strengths and areas of difficulty is indicated. This approach ensures establishment of a safe, individualized pre- and postsurgical plan that empowers the patient via maximizing the use of his or her assets. The active and committed involvement of a caregiver who is able to accommodate the patient's limitations is critically important. Implementation of a full neuropsychological evaluation is timely, expensive, and burdensome to the patient, and requires interpretation by a highly specialized psychologist. In the vast majority of bariatric cases, this level of assessment may not be appropriate, as the burden of the assessment outweighs the benefit. Use of a cognitive screening measure that can be administered and interpreted by an unspecialized practitioner offers a sufficient level of assessment for the general population of patients seeking WLS. Similar to a more comprehensive assessment, findings from this screen, in conjunction with self-report, behavioral observations, and collateral information, can be used to inform treatment planning and determine if a more comprehensive cognitive evaluation is indicated. At the bare minimum, patients seeking WLS should have the cognitive capacity to consent to surgical treatment and be able to demonstrate some understanding of the relationship between one's food intake and weight status. While there is currently not enough support within the literature to warrant specialized testing, as our knowledge of the detrimental role of disinhibition and other cognitive variables in WLS outcomes grows, streamlined

cognitive testing approaches may be indicated. For example, patients seeking WLS may be administered a measure that is specifically related to executive functioning.

## Aging adults

Older age has been considered a risk factor for increased postsurgical morbidity and mortality.<sup>4</sup> However, findings are conflicting. One study identified a threefold mortality increase for patients  $\geq 55$  years compared to younger patients.<sup>79</sup> In contrast, another study did not identify a relationship between advanced age and mortality.<sup>80</sup> Other areas of concern include functional limitations that are often associated with advanced age; such limitations could impede patients' ability to participate in physical activity recommendations. There is limited research related to potential risks associated with extreme caloric restriction and rapid weight loss in the aging population, particularly related to loss of lean muscle mass.<sup>81</sup> Deficits in cognitive functioning may limit patients' ability to comply with treatment recommendations that are crucial to successful surgical outcomes, particularly difficulties with immediate memory, planning, and problem solving. Further, aging adults are at higher risk for more rapid cognitive decline in the years following surgery when compared to younger surgical patients.<sup>82</sup>

## Solutions

Given the inconclusive data related to surgical morbidity and mortality, a protocol that considers patients' overall health status, including physiological, psychosocial, and cognitive functioning, is prudent. This approach allows for individualized assessment and treatment planning focused on maximizing patients' strengths and limiting risks associated with their individual areas of difficulty. Research findings simply do not support rigid implementation of firm, relatively arbitrary age cutoffs for surgical candidacy. As far as the authors are aware, there is no study to date that has explored the impact of surgical weight loss on lean muscle mass in the aging population. However, a recent study that involved a high-intensity medically supervised weight-loss program for older adults that involved restricted caloric intake similar to that of weight-loss surgeries found that rapid, high-intensity weight loss was not associated with increased loss of lean muscle mass compared to a moderate-intensity weight-loss program.<sup>81</sup>

Upon identification of cognitive or physical limitations, a plan for adequate compensatory strategies should be agreed upon with the patient at the time of the psychosocial evaluation. This may include the use of electronic devices, such as an alarm to remind the patient of mealtimes, or a physical activity plan that involves the support of an exercise

specialist or physical therapist. More profound limitations may necessitate the participation of a caregiver who takes responsibility for meal planning and preparation. While patients' advanced age puts them at higher immediate risk for cognitive decline, rapid weight loss and remission of associated cardiac and metabolic diseases may reduce the patient's risk of future physical and cognitive decline. Therefore, one might argue that the benefits of an aging patient with obesity undergoing WLS outweigh the risks. Importantly, a caregiving plan for managing a patient's postsurgical diet and lifestyle should be established with the patient to be utilized in the event of future physical or cognitive decline.

## Conclusion

Patients seeking WLS are an increasingly heterogeneous group. The preoperative psychological evaluation is a necessary component in assessing WLS patients' unique strengths and weaknesses and assisting the patient and the medical team anticipate and prepare for postsurgical challenges. While challenges such as maladaptive eating, psychiatric comorbidities, and substance misuse are not uncommon, individualized approaches to meeting these challenges are essential. This requires a comprehensive and thoughtful approach to the preoperative evaluation that includes consideration of the unique needs of special populations. It also requires the involvement of health care providers who are knowledgeable and skilled in working with this patient population. Continued research is needed that focuses on improving successful surgical outcomes, particularly with special populations.

## Disclosure

The authors report no conflicts of interest in this work.

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