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## Mental Health Evaluations for Adolescents Prior to Bariatric Surgery: A Review of Existing Practices and a Specific Example of Assessment Procedures

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### Abstract

**Objective**—Best practice guidelines for adolescents considering bariatric surgery recommend a pre-operative mental health evaluation. However, only general information about these assessments appears in the literature, which makes consistency of administration challenging. This review proposes a specific empirically-derived format for pre-surgical mental health evaluations and summarizes currently available data on the psychiatric functioning of adolescents seeking bariatric surgery.

**Design**—Studies of mental health evaluations for adults preparing for bariatric surgery are reviewed, as is the limited literature relevant to adolescent evaluations. A specific and detailed example of an evaluation (clinical interview, self-report questionnaires, cognitive assessment) used for younger patients at a major metropolitan hospital center is presented, followed by data from an initial group of adolescents completing this evaluation.

**Subjects**—200 adolescents (n=139 female; age: 14–18 y, BMI: 35.4–83.3 kg/m<sup>2</sup>) presenting for bariatric surgery.

**Results**—A notable subset of adolescents reported current Axis I conditions (31.5%) and current mental health treatment (29.5%), but reports of current illicit drug use (1.5%) and regular alcohol use (0.5%) were relatively rare. Procedures for using the completed evaluation and post-surgery monitoring of psychosocial issues are discussed.

**Conclusions**—Adolescents considering weight loss surgery should receive comprehensive pre-surgical mental health evaluations, but additional data are needed to develop specific recommendations the use of these evaluations in post-operative care.

### Keywords

review; mental health evaluation; adolescents; bariatric surgery

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Behavioral interventions for severely obese children and adolescents generally produce modest and poorly-maintained changes in weight<sup>(1-3)</sup>. The limited efficacy of psychosocial treatments and the risk of developing significant and debilitating medical complications (e.g., early-onset type-2 diabetes, hypertension, polycystic ovarian syndrome<sup>4</sup>) necessitate alternative intervention options for seriously overweight adolescents. In recent years, bariatric surgery has become a reasonable choice for this population, and significant growth has occurred in the number of youth receiving these procedures,<sup>(3,5)</sup> bolstered by accumulating evidence of surgical safety and efficacy among younger patients (e.g., 2).

Best practice guidelines for younger populations consistently include the recommendation that adolescents receive a pre-surgery mental health evaluation (e.g., 6, 7). However, given the limits of existing data, descriptions of these assessments are general and varied. For example, early reviews recommended comprehensive psychosocial evaluations with adolescents and parents to identify factors that could affect the outcome of bariatric surgery, focusing on assessment of family functioning, coping skills, and potential comorbidities<sup>(8,9)</sup>. In contrast, the most recent best practice guidelines offer broad recommendations, including post-operative monitoring of depressive symptoms and an assessment of binge eating and purging behaviors, such that treatment is begun if the patient's eating symptoms are "stable" before surgery<sup>(7)</sup>. Specific procedures used to conduct or interpret these evaluations with youth are frequently not presented, which makes consistency in the administration of mental health evaluations challenging.

The present review was conducted to address this need for standardization and to provide a comprehensive resource for clinicians working with adolescents preparing for bariatric surgery. This review includes: (1) a brief summary of the literature on mental health evaluations for adults seeking bariatric surgery; (2) a review of the limited data pertaining to adolescent evaluations; (3) a description of a standard empirically-derived protocol for pre-surgical mental health evaluations with younger patients with specific assessment procedures, and (4) data derived from the use of this protocol with 200 adolescents seeking bariatric surgery at a major metropolitan hospital center.

## Mental Health Evaluations in Adults

When developing a standardized protocol for adolescents receiving bariatric surgery, the example of adults is a useful starting point, as the existing empirical literature is significantly more advanced. Best practice updates for adults seeking bariatric surgery highlight the importance of pre-surgical evaluations because of documented rates of psychiatric comorbidities<sup>(10,11)</sup>. For example, up to 38% of weight loss surgery candidates meet diagnostic criteria for at least one current Axis I disorder<sup>(12)</sup> and 5–50% report binge eating disorder (BED)<sup>(13)</sup>. Evaluation procedures with adult bariatric candidates are not uniform, but typically involve a structured or semi-structured interview reviewing the patient's weight and dieting history, current eating behaviors, knowledge of bariatric surgery, motivation and expectation of surgical outcome, social supports and stressors, and psychiatric functioning (e.g., The Boston Interview<sup>(14)</sup>). Self-report instruments like the Weight and Lifestyle Inventory (WALI<sup>(15)</sup>) are commonly used with adults to elicit information and guide subsequent interviewing of the patient<sup>(16)</sup>.

A minority of adult patients experience a denial or delay of a bariatric procedure for mental health reasons (3–20%<sup>17</sup>), with the most commonly endorsed contraindications to surgery being active psychosis, current substance abuse, heavy drinking, and multiple suicide attempts or a suicide attempt within the previous year<sup>(18)</sup>. Research on the psychosocial predictors of bariatric surgery outcome for adults offers little to inform clinical decisions about surgical appropriateness. Despite high levels of psychopathology among adult surgery

candidates, prospective studies have reported negative<sup>(19–21)</sup>, positive<sup>(22)</sup>, or no associations between baseline mood symptoms and weight loss (e.g., 23, 24). Most research has not found relationships between baseline depression or anxiety and post-operative outcome (e.g., 25, 26) or adherence to pre-surgical medical recommendations<sup>(27)</sup>. Similarly, when assessed prospectively using clinical interviews, pre-operative BED does not impair weight loss outcome up to one year following bariatric surgery (e.g., 13, 28, 29), although the data are less consistent over longer-term follow-ups (e.g., 30–34). This failure to identify a reliable relationship between psychiatric variables and post-surgical outcomes may relate to methodological factors, the small number of well-controlled longitudinal studies, a failure to develop standardized protocols for pre-surgical mental health evaluations, or a lack of longer-term follow-up<sup>(11,14)</sup>. Despite the limited predictive validity of psychosocial variables in adults, pre-surgical mental health evaluations are helpful for other reasons. In particular, some candidates will need to be delayed or denied surgery for psychological reasons (e.g., untreated depression<sup>11,16</sup>), and others need an opportunity for planning and education, including a discussion of issues affecting post-operative weight loss (e.g., changes in diet or activity) and likely outcomes from surgery<sup>(11)</sup>.

## Mental Health Evaluations in Adolescents

Few published studies examine psychiatric symptoms among adolescent bariatric surgery candidates, but the available literature indicates elevated rates of depression, anxiety, eating pathology, stigmatization, and social isolation across studies<sup>(35–39)</sup>, including a notable subgroup with rates of depressive symptoms in the clinical range on the Beck Depression Inventory (16%<sup>(35)</sup>, 25%<sup>(36)</sup>, and 30%<sup>(37)</sup>). Impairments in quality of life are also consistently noted in adolescent bariatric surgery samples<sup>(36–37, 40)</sup>.

Translating existing procedures from adults to adolescents would be a reasonable option when conducting mental health evaluations with younger patients; however, adolescence presents unique developmental challenges, and is characterized by the onset of most major mental health problems<sup>(41)</sup>. Self-management of medical care often begins in adolescence, and this transition is associated with the peak of non-adherence with medical treatment<sup>(42,43)</sup> and related outcomes<sup>(44–47)</sup>. Thus, other adolescent populations may be relevant for comparison when considering mental health evaluations with severely obese youth seeking bariatric surgery.

## Example of Pediatric Transplant

Adolescents undergoing weight loss surgery face analogous requirements to pediatric patients receiving organ transplants, who must adhere to an unremitting medication regimen, attend follow-up visits, avoid risky situations, and manage a lifetime of risk for relapse<sup>(48)</sup>. Psychological factors influence adherence with treatment for adolescents receiving transplants, with post-transplant non-adherence (e.g., attendance at clinic visits) associated with lower health-related quality of life, psychosocial problems, psychiatric diagnoses, abuse, negative body image, and low self-esteem<sup>(43, 49–51)</sup>. Limited data are currently available to evaluate factors influencing post-surgery follow-up among adolescents receiving bariatric surgery<sup>(52)</sup>, and to our knowledge, there are no studies examining the relationship between psychopathology and post-weight loss surgery adherence among adolescents.

Given the paucity of available data in bariatric samples, similarities between adolescents receiving bariatric surgery and youth with other chronic health conditions, and the developmental stage of adolescent bariatric candidates, a review of pediatric pre-transplant psychiatric evaluations by Annunziato and colleagues<sup>(53)</sup> is useful for programs offering pre-bariatric surgery mental health evaluations to adolescents. The authors emphasize the

importance of family involvement among pediatric patients and recommend that a psychiatrist, psychologist, social worker, or transplant coordinator utilize a clinical interview with both patients and caregivers to evaluate the following domains: comprehension and expectations related to the procedure, mental health, family functioning, social support, and behavioral health (e.g., substance abuse). An assessment of cognitive functioning with a psychologist or neuropsychologist is also suggested to evaluate mental retardation, cognitive deficits, or neurological impairments<sup>(53)</sup>.

## The Development of a Standard Protocol for Mental Health Evaluations in Adolescents Receiving Bariatric Surgery

A standard practice for mental health evaluations with adolescent bariatric surgical candidates is needed. Psychologists and psychiatrists in our program have developed such a protocol informed by psychiatric evaluations conducted with adults and other pediatric populations<sup>(53)</sup>. The evaluation procedure includes: (1) a clinical interview, (2) self-report questionnaires, and (3) a cognitive assessment, all of which are described in the sections below. Where relevant, because of the previously described parallels, information about youth receiving organ transplants is provided in the absence of data on adolescent bariatric surgery candidates. Additional sections describe our clinic's standard practice after completing the pre-surgery evaluation, data obtained from the adolescent clinical interview, and psychiatric symptoms that may require specific monitoring post-surgery.

### Clinical Interviews

To date, more than 200 clinical interviews have been completed with adolescents (aged 14 to 18) presenting for bariatric surgery and their parents at the Center for Adolescent Bariatric Surgery (CABS) Program of the Morgan Stanley Children's Hospital of New York Presbyterian by psychologists or psychiatrists with expertise in eating and weight disorders. Evaluators are familiar with the expectations and requirements of the program and attend weekly meetings with members of a multi-disciplinary CABS team (surgery, endocrine, and gastroenterology/nutrition departments) to discuss the ongoing clinical needs of adolescents prior to and following surgery. In addition, clinicians are familiar with significant differences across bariatric procedures, including expected weight losses, risks, mortality, reversibility, and the amount of required follow-up with the surgical team.

Adolescents in the program receive restrictive bariatric procedures, either laparoscopic adjustable gastric banding (LAGB) or gastric sleeve resection, both of which involve a more limited alteration of the gastrointestinal anatomy in comparison to Roux-en-Y gastric bypass (RYGB). During LAGB, a device with an inner inflatable balloon is inserted around the proximal stomach. The device can subsequently be modified through the injection of saline into a port controlling the degree of gastric restriction experienced by the individual<sup>(54)</sup>. Sleeve gastrectomy consists of removing a portion of the stomach with a stapling device such that it resembles a tube<sup>(54)</sup>. The mental health evaluation process is described to candidates and parents as a way to assess cognitive functioning, the adolescent and parent(s) understanding of the surgical procedure and program requirements for diet and physical activity, psychiatric symptoms that might affect adherence to the program's pre- or post-surgical recommendations, and current school and family functioning.

A clinical interview template that considers developmental issues and differences in the presentation and outcome of younger patients has been published previously<sup>(55)</sup>. Consistent with clinical recommendations (e.g., 56), the interview collects information from both the adolescent and parent(s) in two independent meetings. The mental health evaluation typically occurs on one occasion three to six months before surgery to allow the clinician to

gauge adherence to nutritional changes to date. If significant psychosocial issues are identified, adolescents are often re-evaluated closer to surgery, when the interview focuses on changes since the first meeting and, if applicable, follow-up for recommendations regarding the management of psychiatric conditions.

### Adolescent Clinical Interview

#### **Knowledge of Weight Loss Surgery and Motivation/Support for Lifestyle Change**

The interview begins by evaluating knowledge of the surgical procedure and nutritional recommendations of the program, motivation for and adherence with lifestyle changes, support and barriers to these changes, and weight loss goals. Sufficient internal motivation, and the ability of the child and family to share health care responsibilities (see also “Family Functioning” below) are important considerations given data indicating that factors related to diet and exercise can influence weight loss following LAGB for adults<sup>(57)</sup>. Further, for children receiving transplants, motivation for adherence to treatment and perceived control over adherence are associated with post-transplant follow-through<sup>(58)</sup>. Questions in the clinical interview also address perceived external supports in the adolescent’s home environment, including the availability of low calorie foods or drinks and familial support for dietary and exercise changes (e.g., parents eating meals with the adolescent in a dining area, purchasing gym memberships, etc.). Although adolescents’ motivation for lifestyle change is certainly important, adequate assistance from parents, as exemplified by attitudes towards healthy eating and involvement with the surgical process, are also of concern, especially in light of data that most of the female caregivers of adolescents seeking bariatric surgery are obese or extremely obese (86.7%<sup>59</sup>). Although adolescents in the CABS program only receive restrictive bariatric procedures, similar issues are relevant to younger patients seeking RYGB. Additional psychoeducation about the medical management of a malabsorptive procedure and post-operative side effects (e.g., “plugging,” dumping syndrome, nutritional deficiencies) would be needed for RYGB evaluations.

**Weight and Eating History**—The adolescent clinical interview subsequently obtains an eating and weight history. Previous formal weight loss attempts, or diets supervised by a professional (e.g., nutritionist, pediatrician), are evaluated. Participation in commercial weight loss programs, some of which limit access or discourage the involvement of children, and unsupervised dietary plans initiated by the adolescent or parent(s) are not coded. The clinician elicits reasons for problems with adherence in other programs, which allows for a thorough assessment of aspects of behavioral health that may require psychoeducation or intervention (e.g., interpersonal problems in working with providers; deficits in impulse control or frustration tolerance) and evaluates how the patient and his/her family have coped with unsuccessful efforts at weight change in the past<sup>(53)</sup>.

**Psychiatric Status**—Similar to what is recommended for youth with other chronic medical conditions<sup>(53)</sup>, clinicians should obtain sufficient information to differentiate symptom overlap between psychiatric conditions and the sequelae of severe obesity (e.g., fatigue, anhedonia). Clinicians evaluate eating disordered symptoms within the adolescent interview, including binge eating, night eating, and compensatory behaviors as adolescent best practice guidelines<sup>(7)</sup> recommend the initiation of treatment for eating disordered symptoms prior to surgery. Clinicians also assess for current and past psychiatric symptoms, the presence of DSM-IV diagnoses, and history of treatment (i.e., medication or psychotherapy). Explicit psychiatric contraindications for surgery include severe uncontrolled symptoms (e.g., depression, suicidality) and the presence of self-induced vomiting among adolescents presenting for LAGB, due to the possibility of complications<sup>(16)</sup>. Similar to the standards used for adults (e.g., 10, 11), candidates reporting

a history of a serious psychiatric condition at risk for relapse (e.g., bipolar disorder, major depression with psychotic features) can receive surgery if the clinician believes the adolescent is receiving adequate ongoing monitoring by mental health professionals. Other surgical programs providing RYGB also exclude patients for any substance abuse problems identified within the preceding year<sup>(8,9)</sup>. Conditions that compromise the ability to understand the surgical procedure (see “Cognitive Assessment” section below) or complete appropriate follow-up post-operatively also require appropriate mental health treatment before the adolescent obtains clearance for surgery. Other possible exclusions include significant risk taking behaviors (e.g., failure to utilize appropriate birth control) that could lead to limited post-surgical adherence.

**School History**—The adolescent answers questions about several areas of school functioning, including: special education evaluation or placement, neuropsychiatric or educational evaluations, school refusal, repeated grades, summer school attendance, failure of a grade or subjects or citywide exam, current grades, and whether the adolescent is on schedule for high school graduation. A large number of school problems were endorsed in this portion of the clinical interview by adolescent candidates in our program (e.g., greater than 50% of the sample had failed a grade during their academic career<sup>60</sup>). Adolescent candidates have multiple additive risk factors for deficits in school functioning, and clinicians conducting pre-surgery evaluations should consider referral to school counselors to identify any problems with academic advancement, school attendance and need for further supports in classroom and at home<sup>(60)</sup>.

**Family Functioning**—Family functioning is an important focus of the adolescent interview portion of the pre-surgery mental health evaluation, and relationships between the adolescent and family are assessed, including current stressors, physical, sexual, and emotional abuse, and involvement with social services. Obesity in young<sup>(61)</sup> and older adulthood (e.g., 62–64) is associated with childhood abuse and parental neglect, which suggests elevated risk for family conflict among a pediatric population presenting for bariatric surgery. The potential effect of the family environment on adherence to post-surgery treatment recommendations for adolescents has been noted (e.g., 8), but little data is available. Rates of family dysfunction in a cohort of adolescents receiving RYGB (25%) were comparable to extremely obese adolescents receiving behavioral weight management treatment (35.7%), but the effect of dysfunction on subsequent weight outcomes was not evaluated<sup>(59)</sup>. For adolescents receiving LAGB, involvement with social services was associated with a significantly higher BMI (8.2 kg/m<sup>2</sup>) at the time of surgery, and family conflict predicted a reduced rate of change in BMI over the year following surgery<sup>(65)</sup>. Thus, among adolescents receiving bariatric surgery, family functioning and involvement with social services may have an important role in both initial weight and post-surgery weight loss. In addition, among transplant patients abuse is associated with poor outcome<sup>(66)</sup>, and adherence is influenced by lack of parental supervision, parent-child conflict, and other factors like history of contact with social services<sup>(42,67)</sup>. These findings emphasize the need for a thorough evaluation of family functioning among adolescent bariatric surgery candidates.

### Parent Clinical Interview

At least one parent is interviewed by a clinician during the mental health evaluation, and information is elicited about family psychiatric and medical history, support for pre- and post-surgical lifestyle changes, parental motivation for surgery, and the adolescent’s developmental and medical history, previous weight loss attempts, and psychiatric status. Parents are often involved in interventions for obese children and adolescents<sup>(56,68)</sup> to help promote healthy eating and physical activity. Parental changes in BMI have been associated

with weight loss for children receiving behavioral weight loss treatment<sup>(69)</sup>, and lower levels of parental involvement are related to poorer outcomes in pediatric weight loss treatment (e.g., 70). Thus, without parental support during the pre-operative process, it is reasonable to expect that younger patients may experience greater difficulty in deriving benefit from restrictive bariatric procedures in which lifestyle modifications are necessary to achieve substantial weight loss.

The clinician directly asks parents about any psychiatric diagnoses (current or past) of caregiver(s) living with the candidate. As adolescents are at least partially dependent on caregivers for assistance with diet and exercise recommendations and scheduling and attending pre- and post-operative appointments, it is necessary to obtain information about the current level of parental involvement, plans for continued support, and potential barriers to offering help in the future (e.g., active psychopathology). Although the role of parents in successful weight loss surgery outcomes is not well-established, parental distress is associated with negative effects on children post-transplant<sup>(71)</sup>. Further, if the adolescent candidate has experienced prior adherence requirements (e.g., medical treatment, prior attempts at dieting), the parent clinical interview can be an occasion to identify potential problems with post-surgical follow-up (e.g., difficulty maintaining a medication regimen when busy with school) or areas for additional psychoeducation.

## Self-Report Questionnaires

In addition to the clinical interviews described above, the CABS program augments the face-to-face evaluation of symptoms with self-report measures, which are not used to determine eligibility for surgery, but offer another opportunity to assess important clinical features that may be endorsed by self-report. The four primary measures offer a broad assessment of functioning relevant to this population while avoiding a lengthy or burdensome protocol, and include: the Center for Epidemiologic Studies Depression Scale (CES-D; 72), Family Assessment Device (FAD; 73), Eating Disorders Examination-Questionnaire (EDE-Q; 74), and the Pediatric Quality of Life Inventory (PedsQL; 75). The CES-D is a brief (20-item) measure of depressive symptoms often used in community research (e.g., 76, 77), and studies of obese<sup>(78)</sup> and normal-weight adolescents<sup>(79)</sup>. The EDE-Q is a 38-item measure of eating disorder symptoms, which has been used with overweight adolescents and youth with eating disorders<sup>(80,81)</sup>, and includes questions assessing binge eating and compensatory behaviors. The FAD assesses the properties and patterns of communication among family members that discriminate healthy and unhealthy families, and is often reported in studies of physical health conditions and psychiatric disorders among adolescents (e.g., 43, 82). The PedsQL is a 23-item measure of health-related quality of life with both an adolescent self-report and a parent-proxy version for ages 13 to 18 years, and has been used in studies of adolescents receiving bariatric surgery<sup>(48,51)</sup>. Few consistent measures have been employed with adolescent bariatric surgery samples, and the assessments for our program were chosen to be consistent with published best practice guidelines for adolescents receiving bariatric surgery, which suggest administering specific assessments of quality of life, depression, and eating disturbances<sup>(6,7)</sup>.

The EDE-Q<sup>(74)</sup> also offers a specific advantage with this population, as it assesses broad loss of control over eating by measuring the consumption of objectively and subjectively large amounts of food with a sense of loss of control (objective and subjective bulimic episodes). As previously described, most studies of adults have observed no relationship between pre-surgery binge eating and weight loss or weight regain<sup>(83)</sup>; however, loss of control over eating is an important clinical characteristic among obese youth<sup>(84,85)</sup>, and among a severely obese pediatric population, self-reported loss of control eating may negatively impact effectiveness of a family-based behavioral interventions<sup>(86)</sup> and bariatric surgery<sup>(65)</sup>.

Other areas of assessment may also be important for future research on adolescents receiving bariatric surgery. For example, adolescents pursuing bariatric surgery are doing so in a unique developmental period generally characterized by increased impulsive responding and reward seeking. In comparison to children and adults, adolescents demonstrate increased risk-taking behaviors and neural activity in reward-processing regions<sup>(87,88)</sup>, which may relate to an imbalance of functionally mature subcortical systems relative to immature prefrontal cortical control systems<sup>(89)</sup> in the context of hypersensitivity to reward<sup>(88)</sup>. In addition, measures of impulsivity are elevated among overweight children<sup>(90)</sup>, and positive correlations have been found between self-reported impulsivity and caloric intake<sup>(91)</sup>. Deficits in impulse control may therefore have particular relevance to the maintenance of obesity and adolescence, but currently there is a paucity of data examining impulsivity in severely obese adolescents or the relationship between impulsive behaviors and outcome following bariatric surgery.

## Cognitive Assessment

Formal cognitive assessment is employed infrequently in evaluating adult bariatric surgery candidates<sup>(18,92)</sup>, with some investigators remarking that it is rare they encounter a candidate not mentally competent to make a decision about treatment<sup>(16)</sup>. A survey of providers identified the most frequent cognitive contraindications for surgery among adults as IQ below 50, inadequate knowledge about surgery, and unrealistic expectations about surgery, while IQ of 50–70 was considered a “definite contraindication” for bariatric treatment by 45.7% of surveyed professionals<sup>(18)</sup>. Among youth candidates, developmental limitations in cognitive capacity present special challenges for assessment. In pediatric transplant, impaired cognitive abilities are associated with decreased adherence to post-operative treatment regimens<sup>(93)</sup> and greater knowledge about treatment is related to better adherence for adolescents with chronic illnesses<sup>(94)</sup>.

Concerns about the ability of youth to provide informed consent for bariatric surgery have been raised<sup>(95)</sup>, particularly in balancing the immediate negative consequences of obesity (e.g., social stigma, interpersonal conflicts) against the long-term investment required to maintain post-operative weight loss. Gallagher<sup>(95)</sup> thus recommends that psychoeducation and review of informed consent occur across multiple sessions with youth candidates to maximize comprehension of the risks and requirements of surgery. An impaired ability to provide informed consent would render an adult ineligible for a bariatric procedure (e.g., 11); however, individuals younger than 18 provide assent for surgery. It is certainly optimal to have an age-appropriate understanding of the procedure, but in the case of adolescents who agree to surgery where cognitive limitations or other developmental factors limit a more comprehensive understanding, it is possible to proceed with parent(s) offering appropriate informed consent.

As part of the clinical assessment of adolescents in our program, the vocabulary and matrix reasoning subtests of the Wechsler Abbreviated Scale of Intelligence (WASI) are administered to obtain an estimate of IQ. Among adolescents in our program, a significant relationship has been noted between BMI and WASI scores, with increased BMI associated with lower WASI scores<sup>(60)</sup>. This finding underscores the aforementioned issue of whether adolescents can appreciate short- and long-term consequences of surgery, especially among candidates who could most benefit from a bariatric procedure (e.g., at the highest end of the BMI range. Adaptations to the typical screening or approval process are considered for the small proportion of adolescents with scores consistent with either borderline intellectual functioning seen in our program (IQ of 70–85; 10.2%) or mild mental retardation (IQ of 50–70; 2.4%<sup>60</sup>). For example, as parents may be even more integral to the pre- and post-operative process for adolescents with cognitive impairments, the presence of sufficient



familial support is considered an essential prerequisite for receiving surgery. However, while WASI scores provide useful information, variations in emotional and intellectual development are expected even among adolescents within the normal range of IQ, which might necessitate delaying a procedure to allow time for additional maturation or obtaining collateral information from other sources (e.g., outside therapist, pediatrician, etc.) to assess capacity to assent. In addition to standardized assessment tools, clinical experience in working with younger patients can be particularly useful for appreciating these developmental processes.

## Completed Mental Health Evaluations

Following the pre-surgical mental health evaluation, the results are shared with other team members, including staff from surgery, endocrinology, and nutrition. The team discusses any recommendations or requirements for the patient and his/her parent from the mental health provider. Typical recommendations or requirements include: (1) additional education about the pre- and post-operative nutrition requirements of the program or the risks and benefits of the surgical procedure, (2) the initiation of mental health treatment, or (3) further follow-up with one of the clinicians in the program. As the medical consequences of severe obesity are considerable, and few other viable options for significant weight loss are available, surgery is rarely denied on the basis of information obtained in a psychiatric evaluation (1.5% of all cases). However, a procedure may be delayed if the mental health evaluation identifies problems that could interfere with the ability to adhere to post-operative treatment (e.g., a significant major depressive episode for an adolescent with multiple prior suicide attempts), such that appropriate treatment can be delivered before the adolescent receives clearance for surgery.

## Data from Evaluations Conducted in Our Center

If a standardized mental health evaluation for adolescents is adopted across bariatric surgery programs, it is important to establish benchmarks for comparing rates of psychiatric diagnoses obtained by clinical interview. Between August 2006 and March 2012, a total of 200 adolescents were evaluated in our program. Candidates were on average  $15.8 \pm 1.16$  years of age with a mean body mass index of  $47.71 \text{ kg/m}^2$  (range  $35.40\text{--}83.30 \text{ kg/m}^2$ ) and of diverse backgrounds, including 78 (39%) classified as Caucasian, 75 (37.5%) Hispanic, 33 (16.5%) African America, and 14 (7%) mixed race or "other." Using the previously described adolescent clinical interview, 20% of candidates endorsed a history of a DSM-IV Axis I disorder and 31.5% met criteria for a current Axis I condition. Attention deficit and hyperactivity disorder (6%) and major depressive disorder (5.5%) were diagnosed most commonly. Although few met formal criteria for a DSM-IV eating disorder ( $n=8$ ; 4%), current binge eating was reported by 16% of candidates ( $n=32$ ), and 9.5% ( $n=19$ ) reported current night eating. Only two candidates (1%) endorsed purging. A considerable subset of adolescents reported a history of suicidal or self-harm behavior, including 31 patients (15.5%) with past significant suicidal ideation, 11 (5.5%) with a previous suicide attempt, and 21 (10.5%) with past self-injurious behavior. Service usage in this sample was also relatively common, with 37 (18.5%) of candidates reporting a history of involvement with child protective services, 68 (34%) describing a history of psychological or psychiatric treatment (34%), and 59 (29.5%) receiving current treatment for mental health concerns, including 30 (15%) candidates who were taking psychiatric medications. In contrast, reports of current illicit drug use (1.5%) and regular alcohol use (0.5%) were relatively rare.

## Post-Surgery Monitoring of Psychiatric Symptoms

Currently available data from adult studies suggest two areas for post-surgery monitoring: depressive symptoms<sup>(11)</sup> due to the risk of suicide following surgery<sup>(96)</sup>, and alcohol use.

Some adolescents in the CABS program with a history of suicidal ideation, intent, plan, or behavior during the pre-surgical clinical interview have experienced a recurrence of these behaviors following surgery; however, overall decreases in depressive symptoms have been observed among adolescents post-RYGB<sup>(97)</sup> and LAGB<sup>(65)</sup>, which suggests that the majority of patients experience improvements in psychosocial functioning following surgery. Information from this program and other adolescent surgical candidates<sup>(35)</sup> suggest that substance use disorders are uncommon among younger patients before surgery. However, recent studies in adults have noted an increased risk for inpatient alcohol treatment following gastric bypass<sup>(98)</sup> and significant growth in the number of alcohol use disorders during the second post-operative year, particularly among those receiving RYGB<sup>(99)</sup>. Although the rates of alcohol use disorders observed in this study were not elevated in comparison to the general population prevalence, individuals receiving bariatric procedures may experience unique negative consequences of heavy alcohol consumption (e.g., decreased weight loss, vitamin and mineral deficiency<sup>99</sup>). Drugs or alcohol may be misused by adolescents following surgery, and the King and colleagues (2012) findings highlight the need for additional research with adolescents and ongoing monitoring of younger patients to identify any problems and intervene as needed.

## Limitations

At this time, limited information is available about the conduct of pre-operative mental health evaluations for adolescents enrolled in bariatric surgery programs. Further, the utility of these assessments for guiding psychological care with adolescents post-surgery is not known. For adults, routine clinical management does not typically include ongoing psychological treatment post-surgery, perhaps because of an absence of data suggesting any impact of psychological factors on outcomes<sup>(100)</sup>. Thus, until additional information is available about the predictive validity of a pre-surgery mental health evaluation, a recommendation by Marcus and colleagues<sup>(11)</sup> that the surgical team monitor ongoing mental health issues among adult candidates is reasonable for younger populations as well. Information presented in this review is limited by the use of this evaluation at only one university-based hospital with candidates for two bariatric procedures (LAGB, gastric sleeve). As empirical reports of use of gastric sleeve resections with adolescents are in short supply and LAGB is not FDA-approved for individuals younger than 18, future studies should assess the utility of this evaluation with adolescents receiving RYGB at other sites.

## Conclusions

This review presented a specific format for mental health evaluations used with 200 adolescents pursuing a restrictive bariatric procedure, including a standardized clinical interview, self-report questionnaires, and a cognitive assessment. Until additional prospective data are available to offer more specific recommendations, the description of procedures used in our program could help to increase consistency in the format and application of mental health evaluations for younger patients.

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