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Psychological contributors to noncompletion of an adolescent preoperative bariatric surgery program

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Abstract

Background—Noncompletion of preoperative bariatric programs is a significant problem among adolescents. Adult studies suggest that psychological factors contribute to noncompletion of preoperative bariatric programs.

Objective—The aim of this study was to determine the association between adolescent psychological functioning and completion of the preoperative phase of a bariatric program.

Setting—The study was conducted at a tertiary care children's hospital affiliated with a university medical center.

Methods—Seventy-four adolescents and their parents completed an assessment measure of psychological functioning with the Behavior Assessment System for Children, Second Edition. We compared these scores between adolescents who completed the preoperative phase of the bariatric program and proceeded to surgery (completers) to those who did not (noncompleters) using multivariate analysis of covariance and logistic regression analyses, adjusting for demographic characteristics and baseline body mass index.

Results—The mean age was 16.0 (1.1) years, most were female (79.8%), and the group was diverse (48.6%, Caucasian; 33.8%, black; 17.6%, other, including Hispanic, Asian, and biracial). Average body mass index was 50.5 (7.6) kg/m². Forty-two percent of participants were noncompleters. Noncompleters were reported by parents to have more clinically significant externalizing and internalizing behaviors and fewer adaptive behaviors. Noncompleters self-reported more clinically significant internalizing symptoms, emotional problems, and poor personal adjustment.

Conclusion—Adolescents who did not complete the preoperative phase of a bariatric surgery program had more clinically significant psychological symptoms across multiple domains

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compared with those who successfully proceeded to bariatric surgery. Early identification and treatment of psychological symptoms may be important in helping adolescents successfully proceed to surgery.

Keywords

Weight loss Surgery; Adolescence; Pediatric obesity; Attrition

There has been a threefold increase in the prevalence of obesity among youth in the United States over the past 40 years [1], with 1.3% of adolescents between the ages of 12 and 19 having class III obesity (body mass index [BMI] ≥ 40 above the 95% for age) [2]. Bariatric surgery is a promising treatment for adolescents with class III obesity who often are not successful with lifestyle intervention alone [3]. Adolescents who undergo bariatric surgery experience significant weight loss, reduction in associated morbidities, and improved psychological functioning [3–5]. Despite these documented benefits, only approximately 1000 adolescent bariatric surgery cases are performed each year in the United States [6]. Many adolescents referred for bariatric surgery do not successfully complete the mandatory preoperative phase of bariatric programs [7], typically consisting of at least 6 months of behavioral and lifestyle education and treatment with an interprofessional team, contributing to low rates of adolescent bariatric surgery.

In adults referred for bariatric surgery, there are high rates of noncompletion of preoperative bariatric programs, with only 49% to 69% of adults referred for surgery ultimately undergoing surgery [8]. Studies have found that adults who do not complete the preoperative phase of bariatric programs have higher levels of preoperative anxiety [8]. Although studies have not assessed whether psychological factors influence noncompletion of the preoperative phase of bariatric programs among adolescents, studies do suggest that adolescents with more depressive symptoms and lower self-esteem are at increased risk for noncompletion of weight-management programs based on lifestyle and behavior [9,10].

Because adolescents presenting for bariatric surgery may present with psychological comorbidities [11–13], it would be important to determine whether psychological factors contribute to noncompletion of preoperative bariatric programs. Therefore, the aim of this study is to determine if there are differences in psychological symptoms between adolescents who successfully complete the preoperative phase of a bariatric program compared with those who do not. We hypothesize that adolescents who do not complete the preoperative phase of the bariatric program will have more psychological symptoms compared with adolescents who are able to successfully proceed to bariatric surgery.

Methods

Participants—The present study is part of a larger U.S. Food and Drug Administration-approved investigational device exemption trial investigating the safety and efficacy of the laparoscopic adjustable gastric band. One hundred thirty-six adolescents were enrolled in the parent study between 2007 and 2013. Eligible participants included adolescents between the ages of 14 and 18 with a BMI of ≥ 40 or ≥ 35 with the diagnosis of a serious co-morbid

medical condition (sleep-disordered breathing, diabetes, hypertension, nonalcoholic fatty liver disease, or polycystic ovaries). All patients provided assent, and their legal guardian provided consent to participate in this study. This study was approved by the hospital's Institutional Review Board.

Of the adolescents enrolled, 74 (54.4%) completed psychological testing and comprised the cohort for this study. Sixty-two adolescents did not complete psychological testing for one of 4 reasons: they were enrolled in the program before the institution of psychological testing ($n = 8$), they did not attend the program beyond 1 visit (with psychological testing typically performed at the second visit; $n = 21$), they did not have insurance coverage for psychological testing ($n = 22$), or they were enrolled in the program at a time when the program was without a psychologist to perform the testing (either due to medical leave or staffing change; $n = 11$). Adolescents who completed psychological testing did not significantly differ from adolescents who did not complete psychological testing in terms of age, sex, race, BMI, or type of insurance. Adolescents who did not complete psychological testing were significantly less likely to complete the preoperative bariatric program (adjusted odds ratio [aOR] 3.4, confidence interval [CI] 1.6–7.2, $P < .01$), but there was no difference after excluding adolescents who only came to 1 visit (aOR 1.6, CI .7–3.6, $P = .3$).

Categorization of patients based on completion of preoperative bariatric program—Adolescents underwent an initial medical and psychological evaluation before initiation of the preoperative program. To be considered for surgery, adolescents were required to complete a minimum of 6 months in an interprofessional preoperative program, as recommended by an expert task force on bariatric surgery, demonstrating adherence to monthly clinic visits and ability to maintain or lose weight through adherence to lifestyle and behavioral recommendations [14,15]. There was no maximum limit to the time that an adolescent was allowed to participate in the preoperative program and demonstrate requirements for proceeding to surgery. Clinic visits were comprised of family meetings with the physician, psychologist, registered dietician, or exercise physiologist. Adolescents could meet with one or all team members each month, based on the clinical needs of the adolescent as determined by joint decision making among the team and the family. Typical clinic visits lasted 1 to 2 hours. Adolescents who completed the preoperative program and underwent bariatric surgery were categorized as “completers” and those who did not proceed to surgery were categorized as “noncompleters.” Noncompleters included adolescents who left the program voluntarily and those who were unable to demonstrate adherence to the preoperative program guidelines during the entire duration of being in the program, whether it be 6 months or longer.

Measures

Anthropometrics—Height and weight without shoes or excess clothing (e.g., jackets, bulky sweaters) were measured by a medical assistant trained in the measurement of adolescents with obesity at their initial visit to the preoperative program. Baseline height was measured to the nearest .1 cm, using a wall stadiometer. Weight was measured to the nearest .1 kg, using the same digital platform scale for each participant. The BMI was calculated to equal mass (kg)/height (m)².

Demographic characteristics—Parents completed a demographic questionnaire at the adolescent's initial visit to the preoperative program, including the adolescent's age at the time of study enrollment, race, and ethnicity. Race and ethnicity were combined as there was no overlap in identified race or ethnicity and were categorized as Caucasian, black, and other for statistical analysis based on distribution frequencies. Patient insurance status (categorized as Medicaid or private insurance) was collected from the electronic health record.

Psychological functioning—Psychological assessment, including a semistructured clinical interview and testing, was administered by a licensed psychologist at the second preoperative visit. This included completion of the Behavior Assessment System for Children, Second Edition—Adolescent Version (ages 12–21; BASC-2) [16] by both adolescents and their parents. The BASC-2 is a widely used measure of adolescents' social, emotional, and behavioral functioning in the community and home setting [16]. Both parent- and adolescent-report versions have found strong validity and reliability (internal consistency of composites ranging from .80 to .95; test–retest reliability ranging from .81 to .86) [16].

The BASC-2 asks adolescents and their parents to rate the frequency of each of 160 behaviors on a 4-point Likert-scale (never, sometimes, often, always). Items are divided into 4 parent-reported composite scores with 14 subscales and 5 adolescent-reported composite scores with 16 sub-scales (Table 2). Subscales are reported as standardized *t* scores based on normative data for age, with a mean of 50 and a standard deviation of 10. On clinical behavioral subscales, higher scores are indicative of worse psychological function, with scores between 60 and 69 considered “at risk” and scores of 70 or above considered “clinically significant.” On adaptive behavior scales (parent-reported Adaptive Skills and adolescent-reported Personal Adjustment subscales), lower scores are indicative of poorer adaptive functioning with scores between 30 and 39 considered “at risk” and scores of 29 or below considered “clinically significant.”

Statistical analyses

Univariate analyses were conducted to describe the patient population and BASC-2 subscale scores. Bivariate analyses were conducted to determine if there were differences in demographic and anthropometric variables between completers and noncompleters or associations between demographic and anthropometric variables with BASC-2 scores. Bivariate analyses also were used to describe differences between groups in terms of duration of participation in the preoperative program. Multivariate analysis of covariance was used to determine if there were differences between completers and noncompleters across all BASC-2 subscales, including demographic and anthropometric variables that were significantly different between completers and noncompleters as covariates. Between-groups analyses of variance were then conducted to determine differences between completers and noncompleters for each BASC-2 subscale. Logistic regression analyses were conducted to determine the odds of having clinically significant BASC-2 subscale scores based on preoperative program completion status, adjusting for significant demographic and anthropometric variables. Statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS; version 22.0; SPSS, Inc., Chicago, Illinois, USA) software.

Results

Patient demographic and anthropometric characteristics

Characteristics of the cohort are presented in Table 1. The majority of adolescents were female ($n = 59$; 79.8%) and Caucasian ($n = 36$; 48.6%) or black ($n = 25$; 33.7%). Mean age was 16.0 (SD: 1.1) and mean BMI was 50.5 (SD: 7.6, range: 40.2–75.3). Thirty-one (41.9%) of the adolescents did not complete the preoperative program. Completers spent an average of 12.0 (SD: 4.5) months in the preoperative program, whereas noncompleters spent an average of 5.9 (SD: 6.1) months in the program ($P < .01$). Black adolescents were more likely to be noncompleters compared with Caucasian adolescents and adolescents of other races/ethnicities ($\chi^2 = 6.4$, $P = .04$). There were no other significant differences between completers and noncompleters based on other demographic variables or baseline BMI (Table 1) and no significant relationships between BASC-2 scores and demographic characteristics or BMI.

Comparison of mean BASC-2 scores between completers and noncompleters

There was a significant multivariate effect of group membership (completers versus noncompleters) across all psychological subscales of the BASC-2 [Wilk's λ .388, $F(1,35) = 1.7$, $P < .05$, $\eta^2_p = .612$]. There were several significant effects across BASC-2 subscales (Table 2). Adolescents who did not complete the preoperative bariatric program had more parent-reported symptoms across all composites and significantly higher scores on the subscales of hyperactivity, aggression, conduct-disordered behavior, depression, somatization, and inattention. They also were reported by parents to have fewer adaptive behaviors, with significantly lower scores on the subscale of adaptability. Furthermore, adolescents who did not complete the preoperative bariatric program self-reported significantly higher scores on the subscales of atypicality, somatization, and inattention, as well as significantly lower self-esteem scores. Despite the difference in mean BASC-2 scores between completers and noncompleters, mean BASC-2 scores across all subscales were not in the clinically significant range for either group. Therefore, logistic regression analyses were conducted to determine the odds of having BASC-2 scores in the clinically significant range among noncompleters compared with completers.

Odds of clinically significant BASC-2 scores

Parents were most likely to report that adolescents had internalizing behaviors, with more than one third of patients scoring above the clinical cutoff on this composite domain, whereas adolescents were most likely to self-report emotional symptoms, with more than one quarter of patients scoring above the clinical cutoff on this composite domain (Table 3). Noncompleters were more likely to have clinically significant parent-reported scores in all composite domains: externalizing problems (aOR 14.4, CI: 1.3–159.9), internalizing problems (aOR 6.2, CI: 1.8–21.6), behavioral symptoms (aOR 6.9, CI: 1.7–27.6), and adaptive skills (aOR 2.5, CI: .7–9.1). Noncompleters were also more likely to have clinically significant self-reported scores across the composite domains of internalizing problems (aOR 10.8, CI: 1.9–63.1), emotional symptoms (aOR 9.5, CI 2.1–42.9), and personal adjustment (aOR 7.9, CI: 1.5–41.7). Adjusted odds ratios across individual subscales are shown in Table 3.

Discussion

This study is the first to investigate psychological factors that may contribute to noncompletion of the preoperative phase of an adolescent bariatric gastric banding program among a diverse group of adolescents. Adolescents who did not complete the preoperative phase of a bariatric surgery program were reported to have more clinically significant behavioral and emotional symptoms and fewer adaptive skills than adolescents who proceeded to surgery. This highlights the importance of screening and providing treatment for psychological symptoms before bariatric surgery to improve an adolescent's chance of completing a preoperative program and proceeding to surgery.

Consistent with some of the literature on psychological symptoms associated with severe obesity in adolescents [11–13], internalizing symptoms like depression and somatization, poor personal adjustment like low self-esteem and adaptability, and symptoms of inattention and hyperactivity were present in this cohort. Furthermore, noncompleters were more likely to have clinically significant psychological symptoms, potentially diagnostic of a Diagnostic and Statistical Manual of Mental Disorders, 5th edition psychological disorder. These findings are consistent with studies of attrition from lifestyle-based tertiary weight-management programs, which have found an association between psychological comorbidities and attrition [9,10].

Indeed, symptoms of depression, particularly anhedonia and fatigue, could significantly affect motivation to participate in a preoperative program and success in achieving lifestyle goals like regular exercise. Likewise, adolescents with inattention and hyperactivity are often nonadherent to medical regimens and, therefore, may have more difficulty setting and achieving lifestyle goals and attending clinic appointments without appropriate support [17]. Parent psychological functioning was not assessed, but it is possible that the parents of adolescents in this cohort also experience psychological symptoms given the hereditary nature of psychological conditions. Since parents and guardians are crucial to the success of an adolescent seeking bariatric surgery, any familial psychological condition could pose additional challenges.

These findings were consistent among a cohort of adolescents of diverse racial and socioeconomic backgrounds and across a wide weight and age range compared with prior studies. Indeed, there were no differences in psychological symptoms reported among adolescents based on demographic factors. Even though black adolescents in our study were less likely to complete the preoperative bariatric program compared with adolescents of other racial backgrounds, consistent with the literature on attrition in standard tertiary care weight management programs [9,10], our findings report that the effect of psychological symptoms on completion rates remained even when adjusting for race.

This study had several limitations worth noting. Parents and guardians reported more clinically significant symptoms than adolescents although both consistently reported clinically significant inattention and somatization. In the psychological literature, adolescent and parent reports of symptoms are often discrepant [18] despite strong validity and reliability scores for the BASC-2. Evaluation of data from semistructured clinical interviews

in future studies may elucidate the reasons for this discrepancy and provide additional data about psychological co-morbidity beyond self-reported assessments like the BASC-2.

Future studies should also collect data on additional reasons for noncompletion of the preoperative program other than the psychological factors assessed in this study. This may include psychosocial factors like family support, commitment to and desire for surgery, motivation to make lifestyle changes, program satisfaction, and psychosocial stress. It also may include program elements like length of visits, number of visits, financial cost of visits, and composition of visits, or practical factors like a family moving to a different state or changing insurance plans. Finally, 45% of adolescents enrolled in the parent study did not complete the psychological testing and fewer of these adolescents completed surgery. Although these adolescents did not differ from this cohort in terms of demographic characteristics or BMI, they were less likely to not complete the program (though this association was no longer significant when excluding patients who only attended an initial visit to the clinic). It is possible that many of the psychosocial and practical factors described previously may also differ between those who completed the screening and those who did not. Given these limitations, it will be important for future investigations to study the effect of other psychosocial factors beyond those assessed by the BASC-2 on the completion of preoperative bariatric programs, using larger and even more diverse samples of adolescents.

Conclusion

The high rates of clinically significant psychological symptoms discovered on initial screening in this study and the effect of these symptoms on later preoperative program completion rates among a diverse group of adolescents suggest that early psychological consultation and use of evidence-based screening tools like the BASC-2 may be a highly valuable component to include in adolescent bariatric surgery programs. Whereas all adolescents in our bariatric program have contact with a licensed clinical psychologist during the pre- and postoperative period, it may be beneficial to develop a separate clinical pathway for adolescents and their families reporting elevated levels of psychological concerns. This may include increased education for families about the importance of completing the preoperative surgical requirements and regular treatment of psychological concerns that may be barriers to completion of the preoperative program, including adherence to visits and lifestyle recommendations. Not only would treatment of psychological symptoms improve preoperative adherence and likelihood of surgical completion, but it may also improve surgical outcomes as bariatric patients without psychological co-morbidities and those who have received regular mental health treatment are reported to experience more significant weight loss after surgery [19,20].

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Demographic and anthropometric characteristics of adolescents presenting for bariatric surgery by preoperative program completion status

Table 1

Characteristic	Total Cohort (n = 74) M (SD)	Completers (n = 43) M (SD)	Noncompleters (n = 31) M (SD)	<i>t</i>	<i>P</i>
Age	16.0 (1.1)	16.0 (1.1)	16.1 (1.2)	.24	.81
BMI	50.5 (7.6)	49.44 (7.3)	52.1 (7.6)	1.53	.13
	n (%)	n (%)	n (%)	χ^2	<i>P</i>
Gender				2.53	.14
Males	15 (20.2)	6 (40.0)	9 (60.0)		
Females	59 (79.8)	37 (62.7)	22 (37.3)		
Race or ethnicity				6.41	.04
Caucasian	36 (48.6)	26 (72.2)	10 (27.8)		
Black	25 (33.8)	10 (40.0)	15 (60.0)		
Other	13 (17.6)	7 (53.8)	6 (46.2)		
Type of insurance				2.07	.16
Medicaid	31 (41.9)	15 (48.0)	16 (52.0)		
Private insurance	43 (58.1)	28 (65.1)	15 (34.9)		

BMI = body mass index; SD = standard deviation.

Table 2

Mean BASC-2 T-scores by preoperative program completion status

Parent-reported scores	Total Cohort (n = 74) M (SD)	Completers (n = 43) M (SD)	Noncompleters (n = 31) M (SD)	F	P	η^2_p
Externalizing problems	50.0 (8.6)	46.9 (5.9)	53.4 (8.6)	6.67	.02	.17
Hyperactivity	50.9 (8.7)	48.1 (7.6)	54.9 (7.7)	12.86	.01	.19
Aggression	47.6 (6.7)	45.7 (5.0)	49.7 (7.4)	5.67	.02	.10
Conduct	49.6 (7.7)	46.6 (5.3)	52.6 (7.5)	9.75	.01	.15
Internalizing problems	56.5 (12.9)	53.6 (10.1)	58.6 (12.8)	4.57	.01	.12
Anxiety	51.6 (11.5)	50.6 (10.9)	52.5 (11.5)	2.51	.12	.04
Depression	55.0 (10.7)	53.6 (10.9)	56.3 (9.7)	4.49	.04	.08
Somatization	55.9 (11.5)	53.1 (8.7)	61.2 (14.1)	12.0	.01	.18
Behavioral symptoms	53.4 (9.7)	50.3 (7.5)	56.2 (9.8)	4.50	.01	.12
Atypicality	50.7 (9.2)	48.9 (7.8)	51.4 (8.9)	1.34	.25	.02
Withdrawal	54.6 (11.9)	52.8 (11.3)	56.1 (13.6)	1.68	.20	.03
Attention	50.9 (10.6)	49.5 (10.4)	54.4 (11.4)	9.10	.01	.14
Adaptive skills	47.5 (9.5)	50.1 (9.5)	44.5 (8.2)	3.45	.04	.09
Adaptability	48.3 (8.5)	50.8 (7.4)	45.1 (8.9)	4.03	.05	.07
Social skills	50.7 (10.1)	52.2 (11.1)	48.8 (8.6)	.48	.49	.01
Leadership	48.5 (9.7)	49.8 (10.5)	46.7 (7.9)	.16	.69	.00
Activities of daily living	45.4 (10.6)	48.6 (10.1)	41.2 (9.9)	2.46	.12	.04
Functional Communication	48.1 (9.6)	49.7 (9.3)	46.1 (9.8)	2.42	.13	.04
Adolescent-reported scores	M (SD)	M (SD)	M (SD)	F	P	η^2_p
School problems	47.2 (9.2)	45.3 (7.7)	49.5 (10.4)	2.90	.06	.08
Attitude to school	47.0 (11.4)	44.6 (7.3)	50.2 (14.8)	2.53	.12	.04
Attitude to teachers	47.7 (9.9)	46.6 (8.9)	47.9 (10.4)	.01	.91	.00
Sensation seeking	47.4 (8.3)	45.8 (9.0)	48.8 (7.1)	2.76	.10	.05
Internalizing problems	50.2 (9.1)	48.1 (7.6)	52.5 (10.1)	1.79	.18	.05
Atypicality	47.6 (7.5)	45.1 (4.3)	49.1 (7.7)	5.41	.02	.09
Locus of control	48.7(8.8)	47.6 (8.8)	50.8 (10.4)	1.12	.29	.02
Social stress	48.3 (9.8)	46.7 (7.6)	49.3 (10.6)	1.15	.23	.03

Parent-reported scores	Total Cohort (n = 74) M (SD)	Completers (n = 43) M (SD)	Noncompleters (n = 31) M (SD)	F	P	η^2_p
Emotional symptoms	50.9(11.1)	48.9 (8.4)	52.1 (11.7)	1.34	.27	.04
Anxiety	48.9 (9.7)	47.8 (7.4)	50.1 (11.3)	1.17	.20	.03
Depression	49.2 (9.8)	47.3 (9.5)	50.9 (9.5)	1.06	.31	.02
Sense of inadequacy	50.7 (10.6)	49.2 (8.9)	52.6 (12.6)	1.12	.30	.02
Somatization	51.3 (9.2)	49.9 (8.2)	53.5 (9.5)	5.38	.02	.09
Inattention/hyperactivity	50.9 (10.4)	49.7 (9.7)	52.2 (11.7)	.55	.58	.01
Attention problems	49.7 (10.6)	47.9 (9.9)	53.0 (11.3)	4.09	.05	.07
Hyperactivity	50.9 (10.1)	51.3 (9.5)	52.0 (11.3)	.95	.33	.02
Personal adjustment	50.1 (10.1)	51.4 (8.3)	49.2 (11.6)	1.43	.24	.04
Relationship with parents	52.0 (9.9)	52.4 (8.3)	51.4 (11.8)	1.09	.30	.02
Interpersonal relationships	53.3 (7.7)	52.4 (8.2)	54.3 (7.1)	.02	.88	.00
Self-esteem	43.3(13.6)	45.1(12.1)	40.9(15.3)	5.71	.02	.10
Self-reliance	52.8(10.2)	53.6(9.3)	51.8(11.3)	2.29	.14	.04

BASC-2 = Behavioral Assessment System for Children, Second Edition; SD = standard deviation.

Table 3

Clinically significant BASC-2 scores by preoperative program completion status

Parent-reported scores	Score in clinical range (n [%])			aOR*	95% CI	P
	Total (n = 74)	Completers (n = 43)	Noncompleters (n = 31)			
Externalizing problems	8 (10.8)	1 (2.3)	7 (22.6)	14.42	1.30–159.91	.03
Hyperactivity	18 (24.0)	5 (11.6)	13 (41.9)	5.96	1.59–22.41	.01
Aggression	4 (5.4)	1 (2.4)	3 (11.2)	5.54	.38–8.89	.21
Conduct	4 (5.4)	1 (2.4)	3 (11.2)	6.34	.49–82.42	.16
Internalizing problems	23 (31.1)	9 (20.9)	14 (45.2)	6.19	1.77–21.63	.004
Anxiety	18 (24.1)	10 (23.2)	8 (25.8)	1.95	.59–6.51	.28
Depression	21 (28.4)	9 (20.9)	12 (38.7)	3.66	1.14–11.82	.03
Somatization	32 (43.2)	15 (34.8)	17 (54.8)	2.83	1.00–7.99	.05
Behavioral symptoms	17 (23.0)	5 (11.6)	12 (38.7)	6.90	1.72–27.61	.006
Atypicality	10 (13.5)	3 (6.9)	7 (22.5)	3.22	.60–17.34	.17
Withdrawal	28 (37.8)	16 (37.2)	12 (38.7)	1.23	.44–3.47	.69
Attention	22 (29.7)	9 (20.9)	13 (41.9)	3.30	1.04–1.42	.04
Adaptive skills	15 (20.3)	7 (16.3)	8 (25.8)	2.47	.67–9.13	.18
Adaptability	14 (18.9)	4 (9.3)	10 (32.4)	8.45	1.89–37.87	.005
Social skills	10 (13.5)	6 (13.9)	4 (12.9)	.82	.16–4.31	.81
Leadership	15 (20.3)	8 (28.6)	7 (22.5)	1.79	.51–6.35	.37
Activities of daily living	19 (25.7)	7 (16.3)	12 (38.7)	3.73	1.14–12.19	.03
Functional communication	19 (25.7)	7 (16.3)	12 (38.7)	4.23	1.32–13.57	.02
Adolescent-reported scores						
School problems	11 (14.9)	4 (9.3)	7 (22.6)	2.70	.60–12.21	.20
Attitude toward school	12 (16.2)	3 (7.0)	9 (29.0)	6.33	1.42–28.32	.02
Attitude toward teachers	14 (18.9)	7 (16.3)	7 (22.5)	1.38	.39–4.84	.62
Sensation seeking	7 (9.5)	4 (9.3)	3 (11.2)	.95	.18–5.13	.96
Internalizing problems	11 (14.9)	3 (7.0)	8 (25.8)	10.82	1.89–63.06	.008
Atypicality	6 (8.1)	2 (4.7)	4 (12.9)	5.11	.76–34.38	.09
Locus of control	13 (17.6)	6 (13.9)	7 (22.6)	2.09	.58–7.56	.26
Social stress	9 (12.2)	4 (9.3)	5 (16.2)	2.94	.61–14.09	.18

Parent-reported scores	Score in clinical range (n [%])				aOR [*]	95% CI	P
	Total (n = 74)	Completers (n = 43)	Noncompleters (n = 31)				
Emotional symptoms	18 (24.3)	7 (16.3)	11 (35.5)		9.50	2.11–42.85	.003
Anxiety	9 (12.2)	2 (4.7)	7 (22.6)		8.32	1.42–48.62	.02
Depression	12 (16.2)	5 (11.6)	7 (22.6)		2.86	.69–11.84	.15
Sense of inadequacy	17 (23.0)	7 (16.3)	10 (32.3)		3.12	.93–1.49	.07
Somatization	16 (21.6)	7 (16.3)	9 (29.0)		3.93	1.01–15.33	.05
Inattention/hyperactivity	16 (21.6)	7 (16.3)	9 (29.0)		2.85	.82–9.89	.10
Attention problems	14 (18.9)	5 (11.6)	9 (29.0)		4.01	1.09–14.84	.04
Hyperactivity	24 (32.4)	13 (30.2)	11 (35.5)		1.80	.60–5.35	.29
Personal adjustment	14 (18.9)	6 (14.0)	8 (25.8)		7.90	1.50–41.65	.02
Relationship with parents	7 (9.5)	3 (7.0)	4 (12.9)		2.06	.37–11.53	.41
Interpersonal relationships	19 (25.7)	8 (18.6)	11 (35.5)		3.52	1.05–11.82	.04
Self esteem	25 (33.8)	10 (23.3)	15 (48.4)		5.79	1.72–19.47	.005
Self-reliance	7 (9.5)	3 (7.0)	4 (12.9)		3.37	.55–2.68	.19

aOR = adjusted odds ratio; BASC = Behavioral Assessment System for Children, Second Edition; CI = confidence interval.

* Binary logistic regression analyses performed, adjusting for race, gender, age, and BMI.