Child and parent reports of children's depressive symptoms in relation to children's weight loss response in family-based obesity treatment

Rachel P. Kolko Conlon[1], **Kelly T. Hurst**[2], **Jacqueline F. Hayes**[3], **Katherine N. Balantekin**[4], **Richard I. Stein**[3], **Brian E. Saelens**[5], **Mackenzie L. Brown**[6], **Daniel H. Sheinbein**[3], **R. Robinson Welch**[3], **Michael G. Perri**[7], **Kenneth B. Schechtman**[3], **Leonard H. Epstein**[4], and **Denise E. Wilfley**[3]

[1]School of Medicine, University of Pittsburgh, Pittsburgh, PA, USA

[2]National Center for Weight and Wellness, Washington, DC, USA

[3]School of Medicine, Washington University, St. Louis, MO, USA

[4]School of Medicine and Biomedical Sciences, University at Buffalo, Buffalo, NY, USA

[5]Seattle Children's Research Institute and the University of Washington, Seattle, WA, USA

[6]Center for Anxiety and Traumatic Stress Disorders, Massachusetts General Hospital, Boston, MA, USA

[7]College of Public Health and Health Professions, University of Florida, Gainesville, FL, USA

Summary

Background: Studies of the association between children's depressive symptomsand obesity treatment response show mixed results. Different measurement may contribute to the inconsistent findings, as children's depressive symptoms are often based on parent-report about their child rather than child self-report.

Objectives: We assessed both child- and parent-report of child depressive symptoms as predictors of children's obesity treatment response.

Methods: Children with overweight/obesity (body mass index [BMI] ≥ 85thpercentile; N = 181) and their parents reported on children's depressive symptoms prior to family-based behavioral weight loss treatment.

Results: Child percent overweight reduction from baseline to post-treatment wasnot predicted by child self-reported depressive symptoms or parent-report of child symptoms ($P > 0.80$), but was significantly predicted by the interaction between child self-report and parent-report on child ($\beta = 0.14$, $P = 0.05$). In analyses using clinical cutoffs, amongst children with high self-reported

symptoms, those whose parents reported low child depressive symptoms had greater reduction in percent overweight ($t = 2.67$, $P = 0.008$), whereas amongst children with low self-reported symptoms, parent ratings were not associated with treatment outcome.

Conclusions: Including both child self-report and parent-report of child depressive symptoms may inform obesity care. Research is needed to examine differences amongst child and parent depressive symptom reports and strategies to address symptoms and optimize pediatric obesity treatment.

Keywords

child; depressive symptoms; method; obesity; treatment

1 | INTRODUCTION

It is critical to intervene early in pediatric obesity to address weight gain and mitigate negative impacts, including medical and psychosocial problems that present in youth.[1–3] Moreover, early intervention for pediatric overweight/obesity is one of the most important prevention tools for adult obesity and the severe complications that track into adulthood.[4–7]

Family-based behavioral weight loss treatment (FBT) that targets both children and parents has been shown to be effective for children with overweight/obesity.[8,9] However, studies suggest that there is variability in treatment response and long-term sustainability of outcomes.[10] To enhance treatment effectiveness, it is important to elucidate characteristics that may impact FBT response trajectory and degree of weight loss. Depressive symptoms may play an important role in treatment response, given that depressive symptoms are related to higher weight in childhood, adolescence, and adulthood,[11] and depressive symptoms are higher in children who prematurely drop out of behavioral weight loss treatment.[12]

However, research that has examined initial depressive symptoms amongst children with overweight/obesity as predictors of their FBT response show mixed results, with some studies finding that child depressive symptoms are associated with child weight change after treatment[13] and others finding no relation between children's depressive symptoms and FBT response.[14,15]

The inconsistent findings about the relation between children's depressive symptoms and FBT response may have to do with the method of assessing children's depressive symptoms. In general, assessment of depressive symptoms requires conceptual sophistication and language skills to understand and describe the feelings and behaviors associated with depression. Thus, the assessment of depressive symptoms may be challenging for children depending on their developmental level.[16,17] Many studies therefore rely on parents to provide proxy-reports of their children's depressive symptoms. However, only moderate correlations have been found between child self-reported depressive symptoms and parent-report of child's depressive symptoms,[18–20] and the agreement between child self-reports and parent-reports on children has been found to improve as children grow older.[21] Therefore, although there is some agreement between the two report methods, differences

arise when asking parents and children about the child's depressive symptoms. Parents' ability to report on their child's depressive symptoms may be limited because of the nature of depressive symptoms, which are sometimes not observable by others (eg, feeling worthless or sad).[22] Moreover, parents' own psychological functioning may influence their reports on their children's symptoms.[23] Parents with higher or lower depressive symptoms may ascribe symptom levels to their children that are similar to themselves. Thus, assessing children's self-reported symptoms may provide critical information beyond what is gained in the parents' proxy-reports.[22,24] To address these concerns, child self-reports of depressive symptoms have been developed using language and concepts that are more easily understood by children, which have demonstrated good reliability and validity.[16,17,25] Notably, there is only moderate agreement between reports from children's self-reported depressive symptoms and clinician ratings of the children's symptoms, as well, and the concordance improves with child age.[21] Thus, there are advantages and disadvantages to using children's self-reports or parent-reports of their children's depressive symptoms.

Thus, we included measures of both children's self-reported depressive symptoms and parent-reports on their children in our study of FBT. Examining both child and parent sources of information together may provide a more comprehensive picture of children's depressive symptoms and improve our ability to predict FBT response. Therefore, to comprehensively capture the effects of children's depressive symptoms on FBT response, we assessed and compared depressive symptoms as reported by children versus by their parents (ie, each child-parent dyad yielded two informants of child depressive symptoms). We hypothesized that the combination of children's and parents' reports of child depressive symptoms would best predict children's change in relative body weight after FBT, in that higher child depressive symptoms as rated by both children and their parents (ie, concordance in reports of high child depressive symptoms) at baseline would be related to poorer child FBT outcome (ie, a smaller decrease in child relative weight).

2 | METHODS

2.1 | Participants

Child-parent dyads were recruited from two metropolitan areas in the United States. Children were eligible if they had overweight/obesity (body mass index [BMI]   85th percentile for age and sex), were between the ages of 7 and 11 years, and had at least one parent with overweight/obesity (BMI   25 kg/m^2). Dyads were ineligible if either the child or parent was participating in other weight loss treatment, using weight-affecting medications, or had psychiatric and medical conditions that would affect participation in the family-based treatment (for details, see the article by Wilfley et al., 2017, *JAMA Pediatrics*[26]).

2.2 | Procedure

Child-parent dyads were participating in a larger randomized controlled trial (RCT) designed to evaluate long-term weight control treatments for children with overweight/ obesity following 4 months of FBT.[26] The present analyses focus on the FBT phase (first 16 weeks) of the trial, in which all participants received the same intervention. Children

provided written informed assent and parents provided written informed consent prior to beginning the study assessments. Participants completed assessments at baseline and post-FBT. Assessments were conducted by trained research staff, all of whom had at least bachelor's-level degrees. The study was approved by the Washington University School of Medicine and Seattle Children's Research Institute Institutional Review Boards.

2.3 | Intervention

FBT was delivered over the course of 16 weekly sessions. FBT is a multicomponent lifestyle intervention that focuses on energy-balance behaviors to achieve weight loss (ie, promoting healthier dietary and physical activity habits) and instructs parents and children in the use of behavioral techniques such as self-monitoring, stimulus control, reinforcement, and relapse prevention as well as associated parenting strategies. The child weight change goal in FBT was to lose at least 0.5 lb/week, and the traffic light plan[8] was used to code foods and activities into red, yellow, or green categories to provide a simple classification system. Families were encouraged to limit red foods (eg, high-fat and low-nutrient) and red activity (ie, non-school related "screen time") and replace them with green foods (eg, low-fat and high-nutrient) and green activity (ie, moderate- to high-intensity physical activity). Families attended weekly treatment programming, which consisted of 45-minute group sessions (conducted separately for children and parents) and 30-minute individual family sessions with a trained interventionist. In addition, weekly weights and self-monitoring logs of energy-balance behaviors were reviewed in the individual sessions, during which behavioral goals for the upcoming week were established. On average, families completed 13 out of the 16 FBT sessions (±2 sessions).

2.4 | Measures

All measures were collected prior to FBT being initiated unless otherwise specified.

2.4.1 | Demographic variables—Parents reported on their child's age, sex, race (coded for the present analyses as White/Caucasian, Black/African American, or Mixed/Other), and ethnicity (Hispanic/Latino or non-Hispanic/Latino).

2.4.2 | Barratt simplified measure of social status—Parents also reported on their family's socioeconomic status (SES) using the Barratt Simplified Measure of Social Status (BSMSS).[27] Higher scores indicate higher SES.

2.4.3 | Mood and feelings questionnaire-short form—Children completed the Mood and Feelings Questionnaire-Short Form (SMFQ), a 13-item self-report screening instrument for symptoms of depression. It has high internal consistency and good criterion validity, discriminant validity, and internal construct validity.[28] Response ratings use a 3-point Likert-type scale ranging from 0 (*not true*) to 2 (*true*) for each item. Items are totaled, with higher scores indicating greater depressive symptoms.

2.4.4 | Child Behavior Checklist–Parent version—The Child Behavior Checklist (CBCL) is a comprehensive parent-report of children's emotional and behavioral functioning, and it has good reliability and validity.[29] The present study focuses on the

affective problems subscale, which measures parent-report of the child's depressive symptoms. Scores are based on 13 items, each having 3-point Likert-type scale response options ranging from 0 (*not true*) to 2 (*very true or often true*) for each behavior; scores are converted to T-scores, with a higher score indicating greater symptomatology.

2.4.5 | Brief symptom inventory—Parents completed the Brief Symptom Inventory (BSI), a 53-item self-report measure of adult psychopathology that has good internal consistency, test-retest reliability, convergent validity, and predictive validity.[30,31] Given that parent self-reported depressive symptoms may influence parents' reports of their children's depressive symptoms, the present study used the depression subscale (6 items), with each item having response options on a 5-point Likert-type scale (from 0 [*not at all*] to 4 [*extremely*]). Item responses are averaged and are transformed with norms-based scoring.

2.4.6 | Anthropometries and relative weight—Child height and weight were measured at baseline and post-FBT. Measurements were performed by trained research assistants using a stadiometer and calibrated scale, respectively. Participants were measured while wearing light clothing without shoes. Change in percent overweight, defined as the percent above the median BMI for child age and sex,[32] was used as the main outcome variable. Change in Centers for Disease Control and Prevention-normed standardized body mass index (zBMI) with the lambda-mu-sigma (LMS) method was also evaluated as a secondary outcome variable.

2.5 | Analyses

All analyses were conducted using SPSS version 21 (SPSS Inc., Chicago, IL). Families who completed post-FBT assessments (N = 181) were included in analyses. Intent-to-treat analyses were also conducted amongst all families enrolled in FBT (N = 241), with child baseline percent overweight carried forward for those missing post-FBT assessments, and yielded a similar pattern of findings; thus, intent-to-treat analyses are not presented in detail.

Depressive symptoms (child self-report and parent-report) and child relative weight (percent overweight and zBMI) were first examined as continuous variables. Pearson product moment correlations were calculated between children's and parents' reports of child baseline depressive symptoms.

Second, linear regression analyses examined baseline depressive symptoms as a predictor of child change in relative weight from baseline to post-FBT. The regression model included three steps. Step 1 consisted of the following covariates; child baseline percent overweight, child sex, child race, child age, and parent self-reported depressive symptoms. Step 2 consisted of the main effects of the independent variables (child self-reported depressive symptoms and parent-report of child's depressive symptoms), and was followed in Step 3 by the interaction term for child self-reported depressive symptoms and parent-report of child depressive symptoms. In the regression model, the continuous predictor variables were centred (subtracting each value from the variable mean). Analyses were also conducted with zBMI as the outcome measure; given that similar patterns of findings were obtained when using zBMI, only results for percent overweight are presented. Finally, to graph and interpret the interaction effect, simple-slope analyses were conducted, dichotomizing the sample

using clinical cutoff scores of greater than or equal to 8 on the mood and feelings questionnaire (SMFQ)[28] for child self-reported depressive symptoms and greater than or equal to 70 on the CBCL[29] for parent-report of child's depressive symptoms.

3 | RESULTS

Sample characteristics are detailed in Table 1. Children's percent over-weight significantly decreased from baseline ($M = 65.3 \pm 26.4$) to post-FBT ($M = 52.3 \pm 27.5$), $t(180) = 21.39$, $P < 0.001$.

3.1 | Association between child self-report on depressive symptoms and parent-report of child's depressive symptoms

Child self-reported depressive symptoms and parent-report of child's depressive symptoms had a weak positive relationship ($r = 0.15$, $P = 0.049$).

3.2 | Baseline child depressive symptoms in relation to change in child percent overweight

The full regression model predicting change in child percent over-weight was significant, $F(1,172) = 3.87$, $P = 0.05$ (Table 2). The main effects of baseline child self-reported depressive symptoms ($\beta = -0.02$, $P = 0.80$) and parent-report of child's depressive symptoms ($\beta = -0.01$, $P = 0.92$) on change in child percent overweight were not significant (Step 2; Table 2). However, the interaction between baseline child self-reported depressive symptoms and baseline parent-reported child's depressive symptoms was significantly related to children's change in percent overweight ($\beta = 0.14$, $P = 0.05$; Step 3, Table 2). Simple-slope analyses to illustrate the pattern of findings (above versus below the clinical cutoff; Figure 1) indicated that children with low depressive symptoms demonstrated similar relative weight loss, regardless of their parent-report on child depressive symptoms ($t = 0.07$, $P = 0.95$; n = 114 below the cutoff on both measures; n = 14 below the cutoff on the child self-report and above the cutoff on the parent-report). However, amongst children who reported depressive symptoms above the clinical cutoff, those whose parents reported that the child had depressive symptoms below the cutoff (ie, discordance in reporting; n = 43) had greater change in percent overweight than those whose parents reported that the child had levels of depressive symptoms above the clinical cutoff (ie, concordance in reporting; n = 10; $t = 2.67$, $P = 0.008$).

4 | DISCUSSION

This study examined children's depressive symptoms from two informants in relation to children's response to FBT. While the overall sample demonstrated clinically-significant reductions in percent over-weight from baseline to post-FBT, neither child- nor parent-report of child depressive symptoms alone predicted child change in relative weight. However, the interaction of parent- and child-report was related to child percent overweight outcome. Children who self-reported higher depressive symptoms with a parent who also reported higher child depressive symptoms had the least relative weight loss.

Regarding the association between child self-reported depressive symptoms and parent-report on their child's depressive symptoms, although the correlation between these two informant sources was significant, it was small,[33] highlighting the difference in perceptions of children's depressive symptoms between parents and children, and the potential risks of relying solely on children's or parents' reports when evaluating child depressive symptoms.[22] The discrepancy in assessment methods (ie, child self-report vs parent-report on child) may explain previous studies that found child depressive symptoms and weight loss treatment outcome were unrelated,[14] as depressive symptoms have typically been assessed via parent-reports alone. Given that children can provide valid and reliable self-reports on their internalizing states,[34] our findings suggest that including child self-reported assessments as a complement to parent-report of child depressive symptoms may increase sensitivity and accuracy in diagnosing and addressing child depressive symptoms amongst children seeking overweight/obesity treatment, and potentially across other child populations.

In addition to including the child's self-report, these findings suggest that the combination of evaluations of children's baseline depressive symptoms from multiple sources are significantly predictive of children's FBT outcome. Our results indicate that children who had higher depressive symptom scores on both the child- and parent-reports exhibited poorer treatment response compared with children whose parents reported lower child depressive symptoms. One potential explanation for this finding is that the level or type of depressive symptoms may be more severe in this concordant group. Children with concordant high depressive symptoms may have higher levels of systematic inflammation or lower levels of physical activity than the other groups of children, as these factors are associated with both depressive symptoms and overweight/obesity.[35] Further research is needed to explore the potential influence of inflammation and physical activity on the association between depressive symptoms and FBT response.

It is also possible that environmental factors that are related to depressive symptoms in children, such as family discord and other stressors,[36] affect child and parent concordance in ratings of child depressive symptoms. Moreover, incorporating additional content and skills to promote mood management and communication about emotions amongst children and parents may benefit children with higher levels of depressive symptoms as indicated by both child and parent report, and may enhance children's weight loss treatment response.

We did not find significant differences amongst children who self-reported lower levels of depressive symptoms (comparing children whose parents reported the child had low vs high depressive symptoms), suggesting that children with lower levels of symptoms were able to perform well in FBT. Our results are similar to recent research on psychosocial moderators of weight management interventions amongst children, which found that family functioning and child self-reported self-esteem moderated children's weight loss treatment response.[37] Taylor and colleagues found that children with poor family functioning and lower self-esteem had better weight- and health-related outcomes in family-based obesity lifestyle intervention compared with routine outpatient care, whereas children with high self-esteem and high family functioning performed well in both interventions.[37]

There were several strengths to this study. This is one of the largest trials of FBT for childhood overweight/obesity, and one of the few studies to include evaluations of children's depressive symptoms from both child and parent informants. In addition, the correlation found between the children's self-reports and the parent-reports on their children's depressive symptoms replicates that of extant published studies in samples that were not seeking overweight/obesity treatment. There were also several study limitations. All families received FBT, thus reducing the ability to examine treatment-specific effects of depressive symptoms or different measures of depressive symptoms. In addition, this study focuses on symptoms assessed via questionnaires, rather than formal diagnoses of depression by using diagnostic interviews. However, these questionnaires have been validated and used in previous studies to provide meaningful information about children's depressive symptoms, and the evaluation of symptoms may be more generalizable and relevant for overweight/obesity and weight loss treatment-seeking samples than are narrower diagnostic categories. Thus, it is important to note that the pattern of findings may differ in samples with higher rates of depression or depressive symptoms at/above the clinical cutoff. It also is useful to note that the child and parent reports of children's depressive symptoms did not use the same measure, such as the CBCL (parent-report) and associated Youth Self Report.[38] Further evaluation of the associations amongst children's self-reported depressive symptoms, parent-report of children's depressive symptoms, and response to FBT is warranted using child- and parent-report measures of the same measurement system.

In addition, more frequent monitoring of depressive symptoms to identify shifts in symptomatology may provide key information about child-parent concordance in ratings of child depressive symptoms and children's trajectory of response to FBT. Assessing children's depressive symptoms at multiple time points–which is aided by the use of brief questionnaires rather than more burdensome interviews–may capture potential changes in symptoms throughout treatment, thus offering opportunities for tailoring interventions to address factors related to depression, parental support, and treatment adherence. The present study focuses on baseline variables as predictors of treatment response; thus, in addition to changes in depression over time, future studies are warranted on the role of treatment session attendance in relation to depressive symptoms and FBT response. We did not assess whether children were enrolled in treatment for depression or related symptoms prior to the study or while enrolled in FBT, which may have improved their response to FBT; to our knowledge, none of the children were referred from our study interventionists to receive treatment for depression during FBT. An important area of future study is the effect of weight loss and FBT response on children's depressive symptoms. Furthermore, studies amongst adults indicate that treating depressive symptoms in conjunction with weight loss intervention yields improvements in both weight and depression outcomes,[39] and evaluating interventions that target children's depressive symptoms and help parents to address their children's symptoms may similarly improve children's weight loss response.

In conclusion, given the need to identify patient characteristics that relate to treatment response, the present study extends previous research by exploring the role of multiple informant reports of children's depressive symptoms. Results suggest that concordance in reports of higher depressive symptoms by children and their parents may be associated with poorer child weight loss treatment outcome, highlighting the importance of incorporating

child self-reports in addition to parent-reports on their child, and of identifying ways to improve response amongst these children. Future studies are warranted to evaluate children's depressive symptoms over time in relation to FBT response, including long-term follow-up. Assessing depressive symptoms using both child self-report and parent-report on their child, as well as addressing depressive symptoms during the intervention, may offer unique implications for personalization of treatment for pediatric overweight/obesity.

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REFERENCES

1. August GP, Caprio S, Fennoy I, et al. Prevention and treatment of pediatric obesity: an endocrine society clinical practice guideline based on expert opinion. J Clin Endocrinol Metab. 2008;93(12): 4576–4599. [PubMed: 18782869]

2. Barlow SE. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report Pediatrics. 2007;120(Suppl 4): S164–S192. [PubMed: 18055651]

3. BeLue R, Francis LA, Colaco B. Mental health problems and overweight in a nationally representative sample of adolescents: effects of race and ethnicity. Pediatrics. 2009;123(2):697–702. [PubMed: 19171640]

4. Faith MS, Saelens BE, Wilfley DE, Allison DB. Behavioral treatment of childhood and adolescent obesity: current status, challenges, and future directions In: Thompson JK, Smolak L, eds. Body Image, Eating Disorders, and Obesity in Youth: Assessment, Prevention, and Treatment. Washington, D. C: American Psychological Association; 2001:313–319.

5. Golan M, Fainaru M, Weizman A Role of behaviour modification in the treatment of childhood obesity with the parents as the exclusive agents of change. Int J Obes Relat Metab Disord. 1998;22(12): 1217–1224. [PubMed: 9877257]

6. Serdula MK, Ivery D, Coates RJ, Freedman DS, Williamson DF, Byers T. Do obese children become obese adults? A review of the literature. Prev Med. 1993;22(2):167–177. [PubMed: 8483856]

7. O'Connor EA, Evans CV, Burda BU, Walsh ES, Eder M, Lozano P. Screening for obesity and intervention for weight management in children and adolescents: evidence report and systematic review for the US preventive services task force. JAMA. 2017;317(23):2427–2444. [PubMed: 28632873]

8. Epstein LH, Paluch RA, Roemmich JN, Beecher MD. Family-based obesity treatment, then and now: twenty-five years of pediatric obesity treatment. Health Psychol. 2007;26(4):381–391. [PubMed: 17605557]

9. Yackobovitch-Gavan M, Wolf Linhard D, Nagelberg N, et al. Intervention for childhood obesity based on parents only or parents and child compared with follow-up alone. Pediatr Obes. 2018;13(11):647–655. [PubMed: 29345113]

10. Wilfley DE, Tibbs TL, Van Buren DJ, Reach KP, Walker MS, Epstein LH. Lifestyle interventions in the treatment of childhood overweight: a meta-analytic review of randomized controlled trials. Health Psychol. 2007;26(5):521–532. [PubMed: 17845100]

11. Liem ET, Sauer PJ, Oldehinkel AJ, Stolk RP. Association between depressive symptoms in childhood and adolescence and overweight in later life: review of the recent literature. Arch Pediatr Adolesc Med. 2008;162(10):981–988. [PubMed: 18838652]

12. Zeller M, Kirk S, Claytor R, et al. Predictors of attrition from a pediatric weight management program. J Pediatr. 2004;144(4):466–470. [PubMed: 15069394]

13. Epstein LH, Wisniewski L, Weng R. Child and parent psychological problems influence child weight control. Obes Res. 1994;2(6): 509–515. [PubMed: 16358399]

14. Braet C Patient characteristics as predictors of weight loss after an obesity treatment for children. Obesity (Silver Spring). 2006;14(1): 148–155. [PubMed: 16493133]

15. Pott W, Albayrak O, Hebebrand J, Pauli-Pott U. Course of depressive symptoms in overweight youth participating in a lifestyle intervention: associations with weight reduction. J Dev Behav Pediatr. 2010; 31(8):635–640. [PubMed: 20814339]

16. Hodges K. Depression and anxiety in children: a comparison of self-report quesitonnaires to clinical interview. Psychol Assess: J Consult Clin Psychol. 1990;2(4):376–381.

17. Deighton J, Croudace T, Fonagy P, Brown J, Patalay P, Wolpert M. Measuring mental health and wellbeing outcomes for children and adolescents to inform practice and policy: a review of child self-report measures. Child Adolesc Psychiatry Ment Health. 2014;8(1):14. [PubMed: 24834111]

18. Waters E, Stewart-Brown S, Fitzpatrick R. Agreement between adolescent self-report and parent reports of health and well-being: results of an epidemiological study. Child Care Health Dev. 2003; 29(6):501–509. [PubMed: 14616908]

19. Angold A, Weissman MM, John K, et al. Parent and child reports of depressive symptoms in children at low and high risk of depression. J Child Psychol Psychiatry. 1987;28(6):901–915. [PubMed: 3436996]

20. Kim J, Chan YF, McCauley E, Stoep AV. Parent-child discrepancies in reporting of child depression in ethnic groups. J Nurse Pract. 2016;12(6):374–380. [PubMed: 27672356]

21. Renouf AG, Kovacs M. Concordance between mothers' reports and children's self-reports of depressive symptoms: a longitudinal study. J Am Acad Child Adolesc Psychiatry. 1994;33(2):208–216. [PubMed: 8150792]

22. Kolko DJ, Kazdin AE. Emotional/behavioral problems in clinic and nonclinic children: correspondence among child, parent and teacher reports. J Child Psychol Psychiatry. 1993;34(6): 991–1006. [PubMed: 8408380]

23. Najman JM, Williams GM, Nikles J, et al. Bias influencing maternal reports of child behaviour and emotional state. Soc Psychiatry Psychiatr Epidemiol. 2001;36(4):186–194. [PubMed: 11518032]

24. Moretti M, Fine S, Haley G, Marriage K. Childhood and adolescent depression: child-report versus parent-report information. J Am Acad Child Psychiatry. 1985;24(3):298–302. [PubMed: 4008820]

25. Rhew IC, Simpson K, Tracy M, et al. Criterion validity of the short mood and feelings questionnaire and one- and two-item depression screens in young adolescents. Child Adolesc Psychiatry Ment Health. 2010;4(1):8. [PubMed: 20181135]

26. Wilfley DE, Saelens BE, Stein Rl, et al. Dose, content, and mediators of family-based treatment for childhood obesity: a multisite randomized clinical trial. JAMA Pediatr. 2017;171(12):1151–1159. [PubMed: 29084318]

27. Barratt W The Barratt simplified measure of social status (BSMSS). 2012; http://socialdassoncampus.blogspot.com/2012/06/barratt-sim-plified-measure-of-social.html.

28. Angold A, Costello E, Messer S, Pickles A, Winder F, Silver D. Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents. Int J Methods Psychiatr Res. 1995;5:237–249.

29. Achenbach T. Manual for the Child Behavior Checklist/4–18 and 1991 Profile. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.

30. Boulet J, Boss MW. Reliability and validity of the brief symptom inventory. Psychol Assess. 1991;3(3):433–437.

31. Derogatis L, Melisaratos N. The brief symptom inventory: an introductory report. Psychol Med. 1983;13(03):595–605. [PubMed: 6622612]

32. Kuczmarski RJ, Ogden CL, Grummer-Strawn LM, et al. CDC growth charts: United States. Adv Data. 2000;8(314):l–27.

33. Cohen J Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale, NJ: Erlbaum; 1988.

34. Varni JW, Limbers CA, Burwinkle TM. How young can children reliably and validly self-report their health-related quality of life?: an analysis of 8,591 children across age subgroups with the PedsQL 4.0 Generic Core Scales. Health Qual Life Outcomes. 2007;5(1):1. [PubMed: 17201920]

35. Reeves GM, Postolache TT, Snitker S. Childhood obesity and depression: connection between these growing problems in growing children. Int J Child Health Hum Dev. 2008;1(2):103–114. [PubMed: 18941545]

36. Joinson C, Kounali D, Lewis G. Family socioeconomic position in early life and onset of depressive symptoms and depression: a prospective cohort study. Soc Psychiatry Psychiatr Epidemiol. 2017;52(1):95–103. [PubMed: 27837235]

37. Taylor JH, Xu Y, Li F, et al. Psychosocial predictors and moderators of weight management programme outcomes in ethnically diverse obese youth. Pediatr Obes. 2017;12(6):453–461. [PubMed: 27384496]

38. Achenbach T Manual for the Youth Self-Report and Profile. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.

39. Linde JA, Simon GE, Ludman EJ, et al. A randomized controlled trial of behavioral weight loss treatment versus combined weight loss/depression treatment among women with comorbid obesity and depression. Ann Behav Med. 2011;41(1):119–130. [PubMed: 20878292]
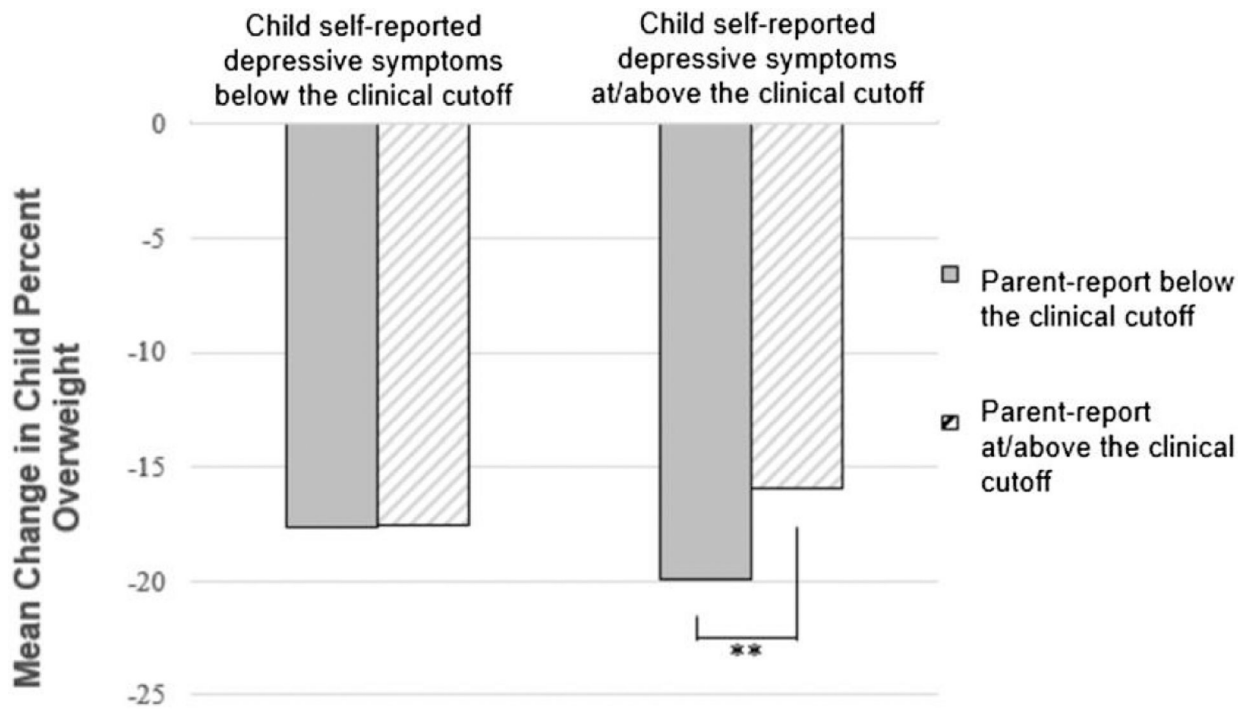
FIGURE 1.
Illustration of change in percent overweight, as predicted by the interaction between child self-report and parent-report on child's depressive symptoms

**p=0.01 Note: Both child self-report and parent-report on child depressive symptoms were dichotomized based on being at/above versus below the clinical cutoff.

TABLE 1

Baseline characteristics of the study sample

Characteristic	Participants (N = 181) $M \pm$ SD or n (%)
Baseline child %OW[a]	65.30 ± 26.4
Change in child %OW during treatment	−13.1 ± 8.2
Child age (years)	9.5 ± 1.3
Child sex (%)	
Male	n = 67 (38%)
Female	n = 112 (62%)
Child race (%)	
White	n = 126 (69%)
Black/African-American	n = 32 (18%)
Mixed/Other	n = 23 (13%)
Child ethnicity	
Non-Hispanic/Latino	n = 162 (89%)
Hispanic/Latino	n = 19 (11%)
Socioeconomic status[b]	43.57 ± 10.35
Site (%)	
Seattle	n = 76 (42%)
St. Louis	n = 105 (58%)
Parent self-reported depressive symptoms[c]	49.1 ± 8.8
Child self-reported depressive symptoms[d]	5.8 ± 5.4
Parent-report on child depressive symptoms[e]	58.7 ± 7.8

[a] %OW = Percent overweight (percent over the median body mass index for age and sex).

[b] Measured by the Barratt Simplified Measure of Social Status (range = 10–65, with higher values representing higher socioeconomic status).

[c] Measured by the Brief Symptom Inventory (range = 42–75, with higher scores representing higher levels of parent self-reported depressive symptoms).

[d] Measured by the Mood and Feelings Questionnaire – Short Form (range = 0–23, with higher scores representing higher levels of child self-reported depressive symptoms).

[e] Measured by the Child Behavior Checklist, Affective Problems subscale (50–79, with higher scores representing higher levels of child depressive symptoms as reported by parents).

TABLE 2

Hierarchical linear regression model to predict change in child percent overweight after 16-session family-based weight loss treatment (N = 181)

Variables in the model	B^a	SE B^b	β^c	R^{2d}	Adjusted R^2	F change	P-value
Step 1				0.09	0.06	3.47	0.05
Child sex	3.80	1.22	0.23[*]				
Child race	2.07	0.84	0.18[*]				
Child baseline percent overweight	−0.01	0.02	−0.04				
Child age	0.22	0.47	0.03				
Parent self-reported depressive symptoms	−0.08	0.07	−0.09				
Step 2				0.09	0.05	0.04	0.96
Child self-reported depressive symptoms	−0.03	0.11	−0.02				
Parent-report on child depressive symptoms	−0.01	0.08	−0.01				
Step 3				0.11	0.07	3.86	0.05
Interaction term: child self-reported depressive symptoms × parent-report on child depressive symptoms	0.03	0.01	0.14[*]				

[a]Unstandardized regression coefficient from the full model.

[b]Standard error of the unstandardized regression coefficient.

[c]Standardized regression coefficient.

[d]tatistic of determination as the coefficient of multiple correlation.

[*]$P < 0.05$.