Adolescent Weight Control: An Intervention Targeting Parent Communication and Modeling Compared With Minimal Parental Involvement

Elissa Jelalian,1,2 PhD, Wendy Hadley,1 PhD, Amy Sato,3 PhD, Elizabeth Kuhl,2 PhD, Diana Rancourt,1 PhD, Danielle Oster,1 BS, and Elizabeth Lloyd-Richardson,4,5 PhD

1Bradley Hasbro Children’s Research Center, Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, 2Weight Control and Diabetes Research Center, Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University, 3Department of Psychology, Kent State University, 4Department of Psychology, University of Massachusetts at Dartmouth, and 5Department of Psychiatry and Human Behavior, Alpert Medical School of Brown University

All correspondence concerning this article should be addressed to Elissa Jelalian, PhD, Bradley Hasbro Children’s Research Center, 1 Hoppin Street, Coro West, Suite 204, Providence, RI 02903, USA.
E-mail: Elissa_Jelalian@brown.edu

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Objective Adolescents weight control interventions demonstrate variable findings, with inconsistent data regarding the appropriate role for parents. The current study examined the efficacy of a standard adolescent behavioral weight control (BWC) intervention that also targeted parent-adolescent communication and parental modeling of healthy behaviors (Standard Behavioral Treatment + Enhanced Parenting; SBT + EP) compared with a standard BWC intervention (SBT).

Methods 49 obese adolescents (M age = 15.10; SD = 1.33; 76% female; 67.3% non-Hispanic White) and a caregiver were randomly assigned to SBT or SBT + EP. Adolescent and caregiver weight and height, parental modeling, and weight-related communication were obtained at baseline and end of the 16-week intervention.

Results Significant decreases in adolescent weight and increases in parental self-monitoring were observed across both conditions. Analyses of covariance revealed a trend for greater reduction in weight and negative maternal commentary among SBT condition participants.

Conclusions Contrary to hypotheses, targeting parent-adolescent communication and parental modeling did not lead to better outcomes in adolescent weight control.

Key words adolescent; intervention; obesity; parents.

Introduction

Rates of pediatric obesity have increased significantly in the past 30 years, and obesity is now identified as a leading cause of preventable death (Ogden, Carroll, Kit, & Flegal, 2012). Effective pediatric weight management interventions are needed, as childhood obesity increases the risk of obesity in adulthood (Guo et al., 2000; Whitaker, Wright, Pepe, Seidel, & Ditz, 1997) and places youth at increased risk for medical (Hannon, Rao, & Arslanian, 2005) and psychosocial sequelae (Griffiths, Parsons, & Hill, 2010; Schwimmer, Burwinkle, & Varni, 2003; Wardle & Cooke, 2005). Although comprehensive behavioral weight control (BWC) interventions (i.e., dietary and physical activity prescription combined with cognitive-behavioral treatment) are effective with school-age children (Jelalian & Saelens, 1999; Wilfley et al., 2007), relatively fewer BWC interventions have targeted adolescents (Butryn et al., 2010) with inconsistent results (Jelalian et al., 2008; Oude Luttikhuis et al., 2009).

Attending to the role of the family in weight-loss interventions may increase the impact of comprehensive BWC interventions. Among studies targeting children,
the research is clear: Family-based BWC interventions that include caregivers are associated with significant decreases in child weight status and are superior to those not involving parents (Berge & Everts, 2011; Kitzmann et al., 2010). Less is known about the role of parents in adolescent BWC interventions. One early study found that adolescents demonstrated comparable decreases in percent overweight (approximately 8%) regardless of whether they participated with or without parents (Coates, Killen, & Slinkard, 1982). In contrast, a second treatment study manipulated the format for parental involvement and demonstrated significantly better absolute weight loss after treatment and at 1-year follow-up when adolescents and parents attended separate intervention sessions, compared with adolescents participating alone or in the same group as parents (Brownell, Kelman, & Stunkard, 1983). However, a replication of this study with Black adolescent girls showed comparable changes in absolute weight at the end of the 16-week intervention regardless of whether parents attended sessions with adolescents, separately, or were excluded from treatment (Wadden et al., 1990). These treatment studies examining the role of parents in adolescent BWC interventions are mixed and do not adequately address the question of what role parents should play in adolescent weight control.

Involvement of parents as active participants in adolescent BWC is consistent with both a developmental framework, which highlights adolescents’ continued reliance on parents (Berk, 1997), and a family systems approach, which emphasizes the importance of the family context, including emotional climate and support for pediatric weight control (Dalton & Kitzmann, 2008; Kitzmann, Dalton, & Buscemi, 2008). In addition to common pediatric BWC components such as self-monitoring, stimulus control, goal setting, problem solving, and relapse prevention, examples of parent-specific involvement include training parents to reinforce specific health behaviors (e.g., reinforcement to reduce sedentary behavior) and modeling of healthy weight-related diet and physical activity behaviors (Dalton & Kitzmann, 2012; Spear et al., 2007). Parental modeling of healthy eating habits has predicted both child and parent decrease in percent overweight over an extended follow-up period (Wrotniak, Epstein, Paluch, & Roemmich, 2005). Likewise, parental self-monitoring of dietary intake has been related to decrease in child body mass index (BMI) z scores at 1- and 3-month follow-ups (Germann, Kirschenbaum, & Rich, 2007). Similarly, change in a parent’s BMI has been related to change in their children’s BMI z score during both active treatment and long-term follow-up (Wrotniak, Epstein, Paluch, & Roemmich, 2004). Parent modeling is one avenue through which parent and child change in weight status may be related, yet little research has explored the impact of parental modeling on adolescents’ weight control. Notably, the single study examining this relationship found a similar relationship to that found among younger child and parent dyads (Sato et al., 2011). These findings suggest that parental modeling may be an important parenting domain to address within adolescent BWC interventions.

A second family domain of possible relevance to adolescent BWC is parent–teen communication. Two large epidemiological studies relying on survey data indicate that adolescent perception of low parental communication and caring, as well as conflict-laden communication, has been associated with unhealthy weight control practices and body dissatisfaction (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Vander Wal, 2012). In a cross-sectional study, videotaped observations of family meals indicated parents of overweight children and adolescents exerted more maladaptive control strategies and offered less support compared with parents of normal-weight peers (Moens, Braet, & Soetens, 2007). Furthermore, in qualitative interviews, parents of overweight/obese adolescents have noted a lack of knowledge regarding how to communicate effectively with their teens (Boutelle, Cafri, & Crow, 2012). These findings suggest that effective communication, especially related to weight and healthy weight-related behaviors, is a struggle for overweight/obese teens and their parents and highlights the utility of explicitly addressing weight-related communication within BWC interventions. Interventions that include a strong communication component have been successfully used to address adolescent health behaviors, such as diabetes (Wysocki et al., 2000, 2006), but have not been examined in the area of weight control.

The current study examines the preliminary efficacy of an adolescent BWC intervention targeting both improved parental modeling of weight control behaviors and improved parent–teen communication on weight-related topics as novel contributions to a standard BWC treatment (Standard Behavioral Treatment + Enhanced Parenting; SBT + EP). We hypothesized that adolescents randomized to SBT + EP would demonstrate greater decreases in weight following a 16-week intervention than adolescents randomized to a standard behavioral treatment (SBT). We further hypothesized that parents of adolescents randomized to SBT + EP would demonstrate greater decreases in BMI than those randomized to SBT. Secondary analyses included examination of differential change in parental modeling of weight control behaviors, and parent–teen communication following the intervention. We expected
dyads assigned to SBT + EP to demonstrate greater improvement in parental modeling and communication as compared with dyads assigned to SBT. Participant attendance and satisfaction data were obtained to provide information regarding treatment acceptability.

**Method**

**Participants**
Participants were aged 13–17 years (M = 15.10, SD = 1.33) and primarily female (76%; n = 37). The racial/ethnic composition of the sample was primarily White (67.3%). Of the total sample, 12.2% identified as Hispanic/Latino. All participants were overweight or obese, with an average BMI of 32.16 (SD = 3.64) and percent overweight of 61.59 (SD = 17.59; see Table I).

The average age of participating parents was 45.97 years (SD = 6.97), and most were female (96%). Participating parents demonstrated a range of weights (BMI: M = 31.11, SD = 6.48).

**Procedure**
Adolescents were recruited from area pediatricians and family practice physicians, as well as through local newspaper advertisements. A brief telephone interview was used to determine preliminary eligibility. Inclusion criteria were that the adolescent (1) be 13–17 years old, (2) have a BMI ≥95th percentile and absolute BMI ≥40, and (3) have at least one involved English-speaking caregiver available to participate in the treatment protocol. Adolescents were excluded if (1) they, or their caregiver, were involved in another weight-loss program, (2) had a medical condition that would interfere with the prescribed dietary plan or participation in physical activity, (3) were developmentally delayed such that intervention materials would be inappropriate, or (4) were in treatment for, or diagnosed with, a major psychiatric disorder, including an eating disorder, at the time of screening. Eligible participants attended an informational meeting where study details were reviewed and adolescent anthropometrics were obtained. Before randomization, adolescents completed a 1-week “adherence trial” during which they were asked to record all dietary intake to provide a behavioral measure of treatment readiness. Families were randomized if the adolescent completed diet records for at least 5 of the 7 days, which is consistent with previous methodology establishing readiness for change (Jelalian, Mehlenbeck, Richardson, Birmaher, & Wing, 2006; Jelalian et al., 2010). Of the 241 families who completed a phone screening, 63 families were interested, eligible, and scheduled for an initial evaluation. Forty-nine families met study inclusion criteria and were available to be randomized (see Figure 1 CONSORT diagram). Medical clearance for adolescent participation

| Table I. Means (and Standard Deviations) of Demographic Variables and Baseline Weight-Related Outcomes |
|-------------------------------------------------|-------------------------------------------------|-----------------|------|
| Adolescents                                     | SBT (n = 26) M/SD (SD)                          | SBT + EP (n = 23) M/SD (SD) | t/w2 p |
| Age                                            | 15.00 (1.30)                                   | 15.21 (1.40)             | t(47) = -0.54 .59 |
| Female                                         | 65%                                           | 87%                       | χ²(1) = 3.07 .08 |
| Minority race                                   | 27%                                           | 48%                       | χ²(1) = 3.30 .07 |
| BMI                                            | 31.17 (3.01)                                   | 33.25 (4.02)             | t(47) = -2.06 .05 |
| Percent overweight                              | 57.24 (13.87)                                 | 66.51 (20.23)            | t(38.3) = -1.89* .07 |
| Maternal modeling                              | 2.99 (0.89)                                   | 2.75 (0.80)              | t(41) = 0.91 .37 |
| Negative maternal commentary                   | 2.85 (0.64)                                   | 2.73 (0.73)              | t(41) = 0.59 .56 |
| Criticism                                      | 0.94 (0.80)                                   | 0.78 (0.75)              | t(45) = 0.71 .48 |
| Parents                                        | SBT (n = 26) M/SD (SD)                          | SBT + EP (n = 23) M/SD (SD) | t/w2 p |
| Age                                            | 46.12 (7.15)                                   | 45.81 (6.93)             | t(47) = 0.15 .88 |
| Female                                         | 96%                                           | 96%                       | X²(1) = 0.01 .93 |
| Some college or more                           | 77%                                           | 87%                       | X²(1) = 0.82 .37 |
| BMI                                            | 31.81 (5.64)                                   | 30.32 (7.36)             | t(47) = 0.80 .43 |
| Dietary choices                                | 2.32 (1.13)                                   | 2.70 (0.76)              | t(41) = -1.24 .22 |
| Self-monitoring                                | 0.55 (0.70)                                   | 0.81 (0.80)              | t(41) = -1.12 .27 |
| Physical activity                              | 0.90 (1.05)                                   | 1.74 (1.17)              | t(41) = -2.51 .02 |
| Criticism                                      | 0.85 (0.81)                                   | 0.99 (0.82)              | t(46) = -0.60 .55 |

Note. SBT = Standard behavioral treatment; SBT + EP = standard behavioral treatment plus enhanced parent component; BMI = body mass index; bolded indicates significant p value.

*aUnequal variances.
in the diet and exercise components of treatment was required from each adolescent’s primary medical care provider before participating in the intervention.

Among families with more than one caregiver, families selected which caregiver would attend the intervention sessions and complete study measures before completing the baseline assessment. This procedure was used to encourage consistent incremental learning across the intervention and to maintain a consistent perspective when collecting parent data of behavioral changes. Using an urn randomization procedure (Stout, Wirtz, Carbonari, & Del Boca, 1994), stratifying by gender and relative degree of obesity (high vs. low determined by median split of the sample), adolescents were assigned to either the SBT or SBT + EP intervention group (see Figure 1). Parental consent and adolescent assent for study participation were obtained before beginning the evaluation. Adolescents and parents completed 90-min assessments separately at baseline and at the end of the 16-week treatment. Study assessments and interventions were conducted in an academic medical center. All study procedures were approved by the institutional review board.

![Figure 1. CONSORT diagram of participant recruitment, randomization, and retention.](https://academic.oup.com/jpepsy/article-abstract/40/2/203/2951759/)

**Interventions**

Both interventions included 16 weekly 1-hr sessions conducted in a group format delivered within an outpatient weight management treatment facility. Intervention sessions were delivered by two facilitators per group, which included a bachelor’s-level research assistant and a clinically trained interventionist (i.e., a 4th-year predoctoral graduate student or licensed psychologist). A nutritionist was additionally present during 5 of the 16 meetings to provide nutrition content, give individualized feedback on diet records, and offer consultation on meal planning. In total, four SBT (n = 5–7 participants) and three SBT + EP (n = 5–7 participants) treatment groups were conducted.

**Standard Behavioral Treatment**

The SBT intervention was modeled after a previously validated adolescent BWC intervention (R01HL65132; R01DK062916; Jelalian, Mehlenbeck, Richardson, Birmaher, & Wing, 2006; Jelalian et al., 2010). Treatment components included diet, exercise, behavior modification, and cognitive restructuring. Adolescents were prescribed a reduced deficit diet (1,400–1,600 kilocalories, <25% from fat), trained in weighing and measuring foods, and were required to track daily dietary intake. Physical activity was increased incrementally to 60 min/day on most days of the week. Cognitive behavioral components were tailored to weight-related topics and included self-monitoring, goal setting, stimulus control, stress management, managing cravings, motivation, self-esteem and body image, problem-solving, and cognitive restructuring. Before each group meeting, teens were weighed and diet records reviewed by a group leader. Parents attended three parent sessions over the course of treatment: (1) orientation to general weight control strategies (session 1); (2) update on teen’s progress (session 8); and (3) review of teen’s progress and end-of-treatment goals (session 16).

**Standard Behavioral Treatment With Enhanced Parent Involvement**

The SBT + EP treatment offered enhanced parent–adolescent communication training about weight-related behaviors in addition to the SBT components described above. Parents and teens attended separate, but simultaneous, sessions with parallel content. Parental modeling was addressed in the following ways. First, parents were asked to modify food choices within the home, including removing high-calorie/high-fat foods from the home and to increase their own levels of physical activity. Second, both teen and parent weight and self-monitoring efforts were reviewed with a group leader.
before each session. To meet the goal of modest weight loss (1–2 pounds weekly), parents with BMI ≥ 25 were prescribed either a 1,200–1,400 calorie/day diet (weight < 250 pounds) or a 1,600–1,800 calorie/day diet (weight > 250 pounds). Parents with BMI < 25 were asked to maintain their weight and were not given a calorie recommendation.

Parents and adolescents assigned to SBT + EP participated in joint activities to support effective communication skill acquisition related to weight control. Communication didactics and skill building activities were integrated into the 16 weekly sessions and accounted for approximately 25% of intervention time. Specific communication content was adapted from an HIV risk-reduction intervention, which demonstrated changes in parent–adolescent communication 6 months after intervention (R01MH63008; Donenberg et al., 2012). This parent–adolescent communication intervention was modified to focus on BWC topics, including diet and physical activity. This particular intervention was selected based on the fact that it was associated with positive improvements in parent–teen communication around a highly sensitive topic (i.e. sexual risk). In vivo communication activities emphasized active listening, assertive communication, and affect management. A “graded” approach was used with regard to both content and process, such that dyads practiced using effective communication skills around less conflict-laden topics and then gradually practiced these same skills when discussing more affectively charged topics. Early in the intervention, communication process was targeted as parent–adolescent dyads role-played assertive communication skills (listening, I-statements, eye contact, etc.) with fully scripted role plays that modeled effective communication. After these assertive communication skills were introduced, the intervention shifted to specifically target weight-related communication content, including weight-related commentary and criticism. Specifically, dyads transitioned to role-played partially scripted weight-related discussions for the group and received feedback and ended treatment with a review of a videotaped discussion of a previously chosen weight-related conflict topic (e.g., computer time, unhealthy snacking). During these discussions, the impact of criticism was directly targeted by addressing both verbal and nonverbal criticism by parents and teens. The goal of these communication exercises was to decrease the criticism and negativity while still maintaining problem solving and direct discussion of challenging topics. Parents and adolescents were encouraged to continue to work on their communication skills and set specific individualized communication goals to work on outside of group sessions.

**Treatment Fidelity**

The study investigators developed the intervention content and oversaw treatment delivery across conditions. All facilitators viewed videotapes of previously conducted sessions from the open trial pilot work and reviewed their respective treatment manual to develop familiarity with the general content. Weekly supervision meetings were used to review the previous session, discuss concerns, and rehearse content for the upcoming meeting. Adolescent and parent sessions were videotaped and reviewed during supervision meetings, and any departures from the manualized material were addressed.

**Measures**

All measures were collected at baseline and end of treatment (i.e., 16 weeks).

**Demographics**

Demographics collected included adolescent age, gender, and race and parent age, gender, and education.

**Anthropometrics**

Adolescent and parent height and weight were obtained on a stadiometer and digital scale. Adolescents were measured in hospital gowns with underclothing and no shoes, and parents were measured in street clothing. Weight and height were used to calculate BMI (kg/m²) and percent overweight. Percent overweight (i.e., percent over BMI) provides a value relative to the 50th percentile for BMI for the appropriate age and gender. Positive values are over the 50th percentile, and negative values are under the 50th percentile. Percent overweight is calculated as (BMI – BMI at 50th percentile BMI) divided by 50th percentile BMI × 100). Percent overweight was selected as an outcome variable due to its increased sensitivity to weight change as compared with BMI z score and BMI percentile, which reaches a ceiling with overweight/obese populations (Cole, Faith, Pietrobelli, & Heo, 2005; Paluch, Epstein, & Roemmich, 2007).

**Parental Modeling**

Two measures were used to examine parental modeling of healthy weight-management strategies: the Weight Control Strategies Scale (WCSS; Pinto, Fava, Raynor, LaRose, & Wing, 2013) and the Family Experiences Related to Food Questionnaire (FERFQ; Kluck, 2008). The WCSS was used to examine caregiver report of use of healthy weight control practices and is composed of three subscales: dietary choices, self-monitoring, and physical activity. The measure demonstrates good reliability (subscales ranging from 0.79 to 0.89) and good construct validity.
Alpha coefficients for the three subscales for the current sample were high: dietary choices = .88, self-monitoring = .81, and physical activity = .93.

The FERFQ was used to examine adolescent perceptions of parental modeling of dieting and weight control behaviors (e.g., “Used exercise to control her/his weight/size?”; four items). This nine-item scale is scored on a 5-point Likert-type scale, with higher scores indicative of greater occurrence of the behavior. The measure has demonstrated moderate reliability for the maternal modeling scale, $\alpha = .75$ (Kluck, 2008).

Parent–Teen Communication
Parent–adolescent weight-related communication was examined using the FERFQ Communication subscale and a communication measure specifically developed for the current study (see below). The five-item FERFQ Communication subscale assessed teens’ perception of the frequency of negative comments about weight and appearance made by their parent (e.g., “Criticized your weight/size”). This scale has good internal reliability 0.83; Kluck 2008), which was somewhat lower in the current cohort (0.66). Higher scores indicate more problematic behavior. Because there are no validated questionnaires assessing parental criticism in the context of weight-related communication, the Dietary and Weight-Related Communication Scale was developed specifically for this study. This measure is composed of four primary topics: weight, exercise, sedentary behaviors, and eating. Both adolescents and their participating parent completed this questionnaire. For each topic, adolescents reported on the frequency of having a discussion with their parent over the past week and then provided a rating of the degree of parental criticism experienced during each discussion (e.g., “How often did you and your parent talk about your weight?”, “How much did your parent verbally criticize you during these conversations?”). Response options ranged from 1 = Never/Not at all to 5 = Many times a day/A lot. Parents reported their perception of the frequency of weight-related discussions and associated criticism. A final scale score was calculated by multiplying the mean frequency across the four items by the degree of criticism, with higher scores indicating greater criticism. Separate scores were calculated for teens ($\alpha = .80$) and their parent ($\alpha = .81$).

Data Analysis
To assess our primary hypotheses regarding the effects of treatment condition, analyses were conducted following recommendations for randomized pretest, posttest, and follow-up designs by Rausch, Maxell, and Kelly (2003). Analyses of covariance (ANCOVAs) were estimated in SPSS 19 to examine study hypotheses that participants randomized to the SBT + EP condition would demonstrate greater BMI change and improvement in parental modeling and communication. For each outcome of interest, the end-of-treatment value was the dependent variable, with the analogous baseline value entered as covariate and condition entered as a between-subjects variable. Intent-to-treat analyses carrying baseline values forward were used to conservatively assess changes in the primary outcomes of interest (i.e., teens’ BMI, percent overweight, parents’ BMI), allowing use of data from all 49 participants who were randomized to treatment. For secondary variables (i.e., parental modeling, parent–adolescent communication), only treatment completers were included in the analysis ($n = 43$; 88%). Paired-sample t tests were conducted to evaluate within-group time effects on each outcome. The study was powered at 0.80 to achieve a medium effect size ($f = .26$; partial $\eta^2 = .06$).

Results
Preliminary Analyses
Table 1 includes the means and standard deviations for participants’ baseline characteristics and demographics. Participants randomized to the SBT + EP condition had significantly higher BMIs than participants randomized to the SBT condition ($M_{\text{SBT}} = 31.17$ vs. $M_{\text{SBT+EP}} = 33.25$, $t(1.74) = 1.33, p = .052$). Parents randomized to the SBT condition attended an average of 10.7 sessions ($M_{\text{SBT}} = 33.25$, $t(34.4) = 2.01, p = .021$). Parents randomized to the SBT condition had significantly higher levels of physical activity ($M_{\text{SBT}} = 0.90$ vs. $M_{\text{SBT+EP}} = 1.74$). There were no other significant differences at baseline between individuals randomized to the SBT and SBT + EP groups.

Treatment Attendance and Satisfaction
There was a trend toward better attendance of the SBT treatment, with adolescents assigned to this condition completing a mean of 12.9 sessions (80.5%) and SBT + EP adolescents completing a mean of 10.7 sessions (66.8%; $t(34.4) = 2.01, p = .021$). Parents randomized to the SBT condition attended an average of 2.31 of 3 sessions (76.9%), and parents randomized to the SBT + EP condition attended an average of 10.6 of 16 sessions (66.3%). The proportion of sessions attended by parents was not significantly different across conditions ($f(47) = 1.33, p = .19$). These attendance statistics include five participants who were randomized to the SBT + EP condition, attended at least the first treatment session, and subsequently dropped out of treatment.

Information regarding treatment satisfaction was collected anonymously to decrease demand characteristics
and encourage honest responding. Participants responded using a 5-point Likert scale (1 = Not at all satisfied to 5 = Very satisfied). The proportion of participants in each condition who reported being “pretty” or “very” satisfied (i.e., rated item a 4 or 5) was compared with establish preliminary treatment acceptability. A majority of teens reported satisfied (SBT = 80% vs. SBT + EP = 78%, $\chi^2$ (1) = 0.03, $p = .86$) and having liked participating in treatment (SBT = 72% vs. SBT + EP = 72%, $\chi^2$ (1) = 0.00, $p = .89$). Although the majority of parents liked participating in treatment, regardless of condition (SBT = 80% vs. SBT + EP = 94%, $\chi^2$ (1) = 1.65, $p = .20$), parents who were randomized to the SBT + EP condition were overwhelmingly more satisfied with their teen’s treatment than parents randomized to the SBT condition (SBT = 48% vs. SBT + EP = 100%, $\chi^2$ (1) = 12.80, $p = .00$).

**Primary Weight Outcomes**

An ANCOVA revealed a trend toward significant effects of condition on adolescents’ BMI after treatment ($F(1, 46) = 3.65, p = .06$; Table II), with participants randomized to SBT achieving greater decreases than those in the SBT + EP condition ($M_{SBT} = 30.81$ vs. $M_{SBT + EP} = 31.78$). Similarly, an ANCOVA revealed a trend toward significant effects of condition on adolescents’ posttreatment percent overweight ($F(1, 46) = 3.71, p = .06$), with participants in the SBT condition achieving greater decreases in percent overweight than those randomized to SBT + EP ($M_{SBT} = 54.11$ vs. $M_{SBT + EP} = 58.72$). There was no significant effect of condition on parent BMI ($F(1, 46) = 2.14, p = .11$). Paired-sample $t$ tests were conducted to examine changes within treatment condition over time. These analyses indicated significant decreases in adolescent BMI and adolescent percent overweight from baseline to postintervention ($p < .05$; Table II). No significant decrease was observed in parent BMI ($p > .05$; Tables II and III).

**Secondary Outcomes**

Secondary outcomes were examined using only treatment completers ($n = 43$).

**Parental Modeling**

ANCOVAs did not reveal significant effects of condition on parent-reported dietary choices, self-monitoring, or physical activity, or adolescents’ perception of parental modeling of weight control behaviors (all $p$ values > .05; Table IV). Paired-sample $t$ tests, however, indicated significant decreases in parent-reported dietary choices, self-monitoring, physical activity, and adolescent perceptions of maternal modeling for participants randomized to the SBT condition (all $p$ values < .05; Table II). In contrast, only parent-reported self-monitoring significantly increased by posttreatment for participants randomized to the SBT + EP condition ($p = .024$, all other $p$ values > .05).

**Parent–Teen Weight-Related Communication**

No significant change was observed for adolescent-reported criticism for either condition. ANCOVAs revealed a significant effect of condition on adolescents’ perception of maternal negative commentary such that participants randomized to SBT reported greater decreases than participants randomized to SBT + EP ($M_{SBT} = 2.28$ vs. $M_{SBT + EP} = 2.75$; $F(1, 40) = 6.97, p = .01$; Table IV). No effect of condition was observed for adolescent- or parent-reported criticism (all $p$ values > .05). Paired-sample $t$ tests revealed significant decreases in adolescents’ perception of negative maternal commentary and parent-reported criticism for participants randomized to the SBT condition (all $p$ values < .05, Table II); however, only a significant decrease in parent-reported criticism was observed.

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**Table II. Change in Weight and Weight Control Behavior Variables Baseline to Posttreatment**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline</th>
<th>Posttreatment</th>
<th>$p$</th>
<th>SBT</th>
<th>Significance</th>
<th>Baseline</th>
<th>Posttreatment</th>
<th>$p$</th>
<th>SBT + EP</th>
<th>Significance</th>
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</thead>
<tbody>
<tr>
<td>Adolescent BMI</td>
<td>31.17 (3.01)</td>
<td>29.89 (3.41)</td>
<td>.01</td>
<td>33.25 (4.01)</td>
<td>$&lt; .05$</td>
<td>32.82 (4.06)</td>
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<td>Adolescent percent overweight</td>
<td>57.24 (13.87)</td>
<td>49.91 (16.59)</td>
<td>.00</td>
<td>66.51 (20.23)</td>
<td>$&lt; .05$</td>
<td>63.47 (20.23)</td>
<td>.01</td>
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<tr>
<td>Parent BMI</td>
<td>31.81 (5.64)</td>
<td>31.81 (5.67)</td>
<td>.99</td>
<td>30.32 (7.36)</td>
<td>$&lt; .05$</td>
<td>29.88 (7.63)</td>
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<tr>
<td>Parent dietary choices</td>
<td>2.32 (1.33)</td>
<td>2.87 (0.50)</td>
<td>.011</td>
<td>2.70 (0.76)</td>
<td>$&lt; .05$</td>
<td>2.92 (0.82)</td>
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<tr>
<td>Parent self-monitoring</td>
<td>0.55 (0.70)</td>
<td>0.81 (0.81)</td>
<td>.011</td>
<td>0.81 (0.80)</td>
<td>$&lt; .05$</td>
<td>1.28 (0.67)</td>
<td>.024</td>
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<tr>
<td>Parent physical activity</td>
<td>0.90 (1.05)</td>
<td>1.32 (0.73)</td>
<td>.01</td>
<td>1.75 (1.17)</td>
<td>.008</td>
<td>1.90 (1.00)</td>
<td>.39</td>
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<tr>
<td>Maternal modeling (A)</td>
<td>2.90 (0.89)</td>
<td>2.64 (0.88)</td>
<td>.025</td>
<td>2.75 (0.80)</td>
<td>$&lt; .05$</td>
<td>2.63 (1.02)</td>
<td>.47</td>
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<tr>
<td>Negative maternal commentary (A)</td>
<td>2.85 (0.64)</td>
<td>2.32 (0.70)</td>
<td>.00</td>
<td>2.73 (0.73)</td>
<td>$&lt; .05$</td>
<td>2.71 (0.80)</td>
<td>.89</td>
<td></td>
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</tr>
<tr>
<td>Criticism (A)</td>
<td>0.95 (0.81)</td>
<td>0.80 (0.90)</td>
<td>.30</td>
<td>0.71 (0.77)</td>
<td>.007</td>
<td>0.68 (1.01)</td>
<td>.89</td>
<td></td>
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<tr>
<td>Parent-reported criticism</td>
<td>0.85 (0.19)</td>
<td>0.77 (0.17)</td>
<td>.029</td>
<td>1.21 (0.83)</td>
<td>.004</td>
<td>0.76 (0.50)</td>
<td>.013</td>
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</tbody>
</table>

Note. SBT = standard behavioral treatment; SBT + EP = standard behavioral treatment plus enhanced parent component; (A) = adolescent report; BMI = body mass index; bolded values indicate significant $p$ value.
Table III. **ANOVA Estimates of Treatment Effects on Primary and Secondary Outcomes (N = 49)**

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>F</th>
<th>Partial $\eta^2$</th>
<th>p</th>
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<tr>
<td><strong>Adolescent BMI</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Condition</td>
<td>1</td>
<td>3.65</td>
<td>.07</td>
<td>.06</td>
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<tr>
<td>Baseline BMI</td>
<td>1</td>
<td>182.85</td>
<td>.80</td>
<td>.00</td>
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<tr>
<td><strong>Adolescent percent overweight</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>1</td>
<td>3.71</td>
<td>.08</td>
<td>.06</td>
</tr>
<tr>
<td>Baseline percent overweight</td>
<td>1</td>
<td>199.09</td>
<td>.81</td>
<td>.00</td>
</tr>
<tr>
<td><strong>Parent BMI</strong></td>
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<tr>
<td>Condition</td>
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<td>2.69</td>
<td>.06</td>
<td>.11</td>
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<tr>
<td>Baseline parent BMI</td>
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<td>.00</td>
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<tr>
<td><strong>Parent-reported dietary choices</strong></td>
<td>n = 42</td>
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<td>.01</td>
<td>.58</td>
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<tr>
<td>Baseline dietary choices</td>
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<td><strong>Parent-reported self-monitoring</strong></td>
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<td>Condition</td>
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<td>.04</td>
<td>.19</td>
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<tr>
<td><strong>Parent-reported physical activity</strong></td>
<td>n = 42</td>
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<td></td>
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<tr>
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<td>.00</td>
<td>.72</td>
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<tr>
<td>Baseline physical activity</td>
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<td>23.55</td>
<td>.38</td>
<td>.00</td>
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<tr>
<td><strong>Maternal modeling (A)</strong></td>
<td>n = 43</td>
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<tr>
<td>Condition</td>
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<td>0.69</td>
<td>.02</td>
<td>.11</td>
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<td>Baseline maternal modeling</td>
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<td><strong>Maternal negative commentary (A)</strong></td>
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<td>.15</td>
<td>.01</td>
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<td>Baseline negative commentary</td>
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<td>.00</td>
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<tr>
<td><strong>Weight-related criticism (A)</strong></td>
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<tr>
<td>Condition</td>
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<td>0.02</td>
<td>.00</td>
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<td>Baseline criticism</td>
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<td>.00</td>
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<td><strong>Weight-related criticism (P)</strong></td>
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<td>.01</td>
<td>.50</td>
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<tr>
<td>Baseline criticism</td>
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<td>0.45</td>
<td>.01</td>
<td>.51</td>
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</table>

Note. BMI = body mass index; (A) = adolescent report; (P) = parent report; bolded values indicate significant p value; Partial $\eta^2$ represents the unique proportion of variance accounted for by each variable.

Discussion

Adolescents who participated in both active treatment interventions demonstrated significant decreases in weight over the course of the 16-week intervention. Contrary to our primary hypothesis, enhancing parental involvement in an adolescent BWC intervention did not lead to superior decreases in adolescent weight. In fact, there was a trend favoring a greater decrease in BMI and percent overweight for adolescents whose parents were minimally involved in their weight control efforts. This finding contrasts with results of previous BWC studies with adolescents (Coates et al., 1982; Wadden et al., 1990).

Examination of secondary outcomes helps explicate our primary findings related to decreases in adolescent BMI. Key secondary outcomes included parental modeling, as assessed through parent involvement in weight control behaviors, and parent–teen communication. Parents in both treatment conditions endorsed an increase in their weight control behaviors over time, although there was no significant decrease in parent BMI. Notably, parents in the SBT condition reported increases in healthy weight control behaviors despite having limited participation in the intervention. Parents in the SBT condition were encouraged to make changes to the home environment to foster their teen’s ability to adhere to dietary and physical activity prescriptions, but were not explicitly asked to make changes to their own weight-related behaviors. In contrast, parents who participated in the SBT + EP condition were actively involved in treatment and asked to make the same changes as their adolescents. One potential explanation is that parents in the SBT condition spontaneously made these changes to support their teens, even though not prescribed. Simply making changes to the home environment may have been adequate impetus for parents to make their own behavioral changes. Alternatively, our findings may have resulted from a social desirability bias given that parents reported on their own behavior in each of these areas and parents in the SBT condition had limited contact with the interventionists.

Contrary to our hypothesis, adolescents randomized to the intervention with minimal parental involvement reported a greater decrease in overall parental negative commentary. This is noteworthy given that the SBT + EP intervention explicitly targeted parent–teen communication around weight-related behaviors. It is possible that parents who were minimally involved with their teen’s weight control efforts made fewer negative comments because they were not required to devote the same level of time and effort and did not experience potential frustrations related to teen progress. Indeed, some studies have found the burden associated with caregiving for adults and children with other health conditions (e.g., anorexia nervosa, asthma) may lead caregivers to respond in ways (e.g., criticism) that are unintentionally counterproductive to management of the disorder (Fiese, Winter, Anbar, Howell, & Poltrock, 2008; Grover et al., 2011). An alternative explanation is that among families with poorer communication and greater conflict, improving interactions between the adolescent and only one parent may indirectly lead to an increase in family conflict. Subsequent studies
should address communication in all caregivers within
the home.

Findings from the current study need to be considered
in light of a number of limitations. First, the study included
a relatively small sample size and lacked a follow-up
period. Consequently, we were powered to detect only
medium and large effects of condition and lack information
regarding the longer term implications for the two inter-
vention conditions. Second, the majority of participant
dyads were mother–daughter pairs, limiting the generaliz-
ability of our results regarding parental involvement in
adolescent obesity treatment. Third, one of the communi-
cation measures used was newly developed and lacks
established psychometric data. Further, parent–teen com-
munication and parental modeling were assessed via
self-report. A stronger measure of interaction would be
observation of dyad interaction or mealtime behaviors
(Moens et al., 2007; Piazza-Waggoner, Modi, Ingerski,
Wu, & Zeller, 2011). Fourth, while adherence to the
manualized intervention was reviewed during weekly su-
pervision meetings, a formal assessment of treatment
fidelity was not included.

Despite these limitations, this study makes a signifi-
cant contribution to the adolescent weight control literature
by demonstrating an apparent advantage to an intervention
that supports adolescent autonomy and preliminary data
regarding the potential processes through which this bene-
fit may be conferred. Future research should include a
larger sample size to allow for increased power to detect
differential treatment outcomes, as well as a longer follow-
up period to assess the longevity of treatment-related
improvements in weight, parental modeling, and commu-
nication. In addition, future research should examine the
role of adolescent and parent gender as this relates to com-
munication, modeling, and weight control. Recent studies
suggest that the impact of parent modeling of healthy eating
behaviors may work differently for same- versus opposite-
sex parent–teen dyads (Berge & Everts, 2011).

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