Authoritative Feeding Behaviors to Reduce Child BMI through Online Interventions

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Authoritative Feeding Behaviors to Reduce Child BMI Through Online Interventions

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Abstract

Purpose.
The purpose of the study was to examine the feasibility and initial efficacies of parent- and/or child-focused online interventions and variables correlated with child body mass index percentile change.

Design and Methods.
A feasibility and cluster randomized controlled pilot study was used.

Results.
Recruitment was more effective at parent–teacher conferences compared with when materials were sent home with fifth- to eighth-grade culturally diverse students. Retention was 90% for students and 62–74% for parents. Authoritative parent feeding behaviors were associated with lower child body mass index. A larger study is warranted.

Practice Implications.
Online approaches may provide a feasible option for childhood obesity prevention and amelioration.

Children who are overweight and obese are at an increased risk for premature death and health problems in adulthood (Reilly & Kelly, 2011; Tirosh et al., 2011). It is important to address overweight and obesity in childhood because 80% of children overweight at age 10–15 are obese at age 25 (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997), although more than 35% of normal weight youth become overweight or obese as adults (Deshmukh-Taskar et al., 2006).

We certainly want to test and then provide prevention interventions for groups with the highest risk of obesity. Obesity is most prevalent among those with low income (Semmler, Ashcroft, van Jaarsveld, Carnell, & Wardle, 2009), who do not finish high school (Merrill & Richardson, 2009; Singh, Siahpush, & Kogan, 2010). Children from ethnic minority groups have particular risks for obesity during the middle-school years (Stevens, 2010). Improvements in dietary fat intake and levels of physical activity have been found with low-income, middle-school youth after 6 weeks with Project FUN—an eight-module online program based on the Health Promotion and Transtheoretical Models (Frenn et al., 2005).

Increased effectiveness was found in a meta-analysis when parenting strategies were included in the content targeting childhood obesity (Kitzmann et al., 2010). Interventions that included parents were found to be more effective than those targeting children alone (Golley, Hendrie, Slater, & Corsini, 2011). Adding to the importance of including parents in interventions, parents sometimes fail to recognize overweight or obesity in their children (Frenn, Heinrich, Dohmen, & Pruszynski, 2011; Jones et al., 2011).

In considering how parents might best be included in childhood obesity prevention, three recent reviews noted the positive effects of online interventions but recommended further research (An, Hayman, Park, Dusaj, & Ayres, 2009; Nguyen, Kornman, & Baur, 2011; Tate, 2008). Online approaches may foster greater behavior change, which is essential for long-term obesity reduction, as compared with face-to-face approaches because online modalities provide opportunities for more active learning (Casazza & Ciccazzo, 2007; Johnston, 2011).

The purposes of this study were to examine the feasibility and initial efficacies of parent- and/or child-focused online interventions, as well as examine the variables correlated with child body mass index (BMI) adjusted for age and gender (BMI percentile [BMIp]), and change in BMIp. Research questions (RQs) included the following:
1. What percentage of parents and students agree to participate and complete instruments and intervention components, and what reasons are provided for nonparticipation or noncompletion?

2. What parent (BMI, dietary fat intake, physical activity, authoritative feeding behaviors) or child (dietary fat intake, physical activity, perceived parent authoritative feeding behaviors, or family support) variables are associated with pretest child BMIp?

3. Do changes in parent BMI, physical activity, or dietary fat intake correlate with changes in child BMIp, physical activity, and dietary fat intake?

4. What parent, child, or combined interventions demonstrate reduction in child BMIp?

Background

Authoritative parenting and feeding

Beyond working only with children in schools, parent involvement in obesity prevention could be guided by a variety of theories, but authoritative approaches show promise (Davis et al., 2007). Israeli children maintained weight loss for 7 years when their parents participated in an authoritative parenting program (Golan, 2006). Authoritative parenting is characterized by parents who are accepting yet firm. Conversely, overeating and obesity are reported when parents are demanding but do not attend to the child’s satiety cues (Jansen, Mulkens, & Jansen, 2007; van Strien & Bazelier, 2007). Lower child BMIp has been associated with authoritative parenting, as exemplified in feeding behaviors (Birch, Fisher, & Davison, 2003; Cardel et al., 2012; Frenn et al., 2011; Polfuss & Frenn, 2012b, 2012a; Rhee & Lumeng, 2006).

Parental support and role modeling for physical activity and diet

In addition to authoritative feeding behaviors, parental support and modeling are important behaviors to consider (Pugliese & Tinsley, 2007). Consistent correlations were found between adolescent physical activity and parental support (Sallis, Prochaska, & Taylor, 2000).

Social support and role models also have moderated fruit and vegetable availability (Young, Fors, & Hayes, 2004). Children who had greater support for healthy food choices consumed fewer snacks and more fiber (Ayala et al., 2007). Diet modeling by mothers was shown to be highly correlated with children’s consumption of snacks and high-energy drinks (Campbell, Crawford, et al., 2007). Further examination of these antecedents (authoritative feeding, social support, and models) is needed in relation to child BMIp, particularly in groups that are at the highest risk of obesity: low income and culturally diverse children (Kumanyika, 2008).

Method

Design

A descriptive feasibility and cluster randomized controlled pilot study was conducted. Dyads (N = 62) were randomly assigned by classroom to interventions: both parent and child online (n = 15), child online (n = 18), parent online (n = 13), or usual class control (n = 16). Project FUN was delivered for students in classroom settings where each child had a computer, completing the eight modules at his or her own pace over a 3- to 4-week period. Parents completed their online modules during the same time period at home. Follow-up data were collected after 6–9 months. A limited efficacy trial such as this is used to examine feasibility and intermediate outcomes with shorter follow-up periods (Bowen et al., 2009).

Setting and subjects

Low-/middle-income fifth-, seventh-, and eighth-grade students (Asian 7%, African American 28%, Hispanic 7%, Caucasian 33%, other 14%) and a parent for each child participated from three urban schools in the Midwest. Of children (57% female), 62% had normal weight, 20% were overweight, and 18% were obese, based on the
Centers for Disease Control and Prevention (CDC, 2010b) criteria. Of parents (85% mothers), 12% were underweight, 31% had normal weight, 33% were overweight, and 24% were obese, based on the CDC (2010a) criteria.

Interventions
The process of complex intervention development includes examining relevant theories to guide the intervention, modeling the intervention components and means by which they affect the outcome(s), describing intervention components, and comparing it with usual care, followed by a randomized controlled trial with sufficient statistical power (Polit & Beck, 2011). Phase II of intervention development was addressed in this feasibility and initial efficacy pilot study. Given that effective interventions for children in ethnic minority groups, who are at the greatest risk for obesity, were not found in an integrative review of the literature (Stevens, 2010), this exploratory trial was essential before the development of a randomized controlled trial.

The intervention model is shown in Figure 1. The conceptual basis, reduced dietary fat intake and increased level of physical activity found with Project FUN, and the eight-module student online intervention have been reported (Frenn et al., 2005). The six modules of the parent intervention were based on a review of the literature. The modules were designed to develop authoritative parenting approaches, family support, and parental modeling relative to improving children's diets, levels of physical activity, and BMIp. Specific content within each module for both child and parent interventions is shown in Appendix.

The child intervention included four 2- to 3-min videos with culturally diverse child actors from similar schools illustrating the concepts. Interactive components of the online program asked children to identify vegetables or fruits that they would ask their parent/guardian to purchase. Both the child and adult interventions provided links to family physical activity opportunities and healthy recipes they could make together.

Measures
Feasibility measures: Participation and retention
To examine feasibility, parents assigned to the online intervention were asked on a cover sheet if they were willing to participate or only to allow their child to participate. Reasons for nonparticipation were requested. At the end of the program, reasons for not starting or not finishing the program were requested, as well as thoughts regarding what would be most helpful for parents to help their children stay healthy. Descriptive data included numbers of returned consents/assents, completion of measures, and the record of visits to intervention components in the online program. Fidelity was examined in completion of the interventions and follow-up data in accordance with the National Institute of Health Behavior Change Consortium recommendations (Bellg et al., 2004).
Measures to examine initial efficacy

**BMIp**
Seca 869 portable medical grade scale and Seca 214 portable stadiometer were used to privately measure children at school without shoes or jackets. BMI was calculated (weight in pounds + 703/height in inches squared). CDC (2010b) algorithms were used to determine BMIp, incorporating age and gender. BMI for parents was based on self-reported height and weight (CDC, 2010a).

**Dietary fat**
The 21-item, five-option response format Dietary Fat Screening—Adolescents measure available at [http://www.drjamessallis.sdsu.edu/measures.html](http://www.drjamessallis.sdsu.edu/measures.html) (Prochaska, Sallis, & Rupp, 2001) was used. Prochaska and colleagues (2001) reported internal consistency of .88, 1- to 2-week test–retest reliability interclass correlation of .64, and a correlation of .36 with a 3-day food record among seventh- to twelfth-grade students. Internal consistency for the current study was .81.

**Physical activity**
The two-item, 7-day physical activity PACE+ Physical Activity Screening Measure (Adolescents) available at [http://www.drjamessallis.sdsu.edu/measures.html](http://www.drjamessallis.sdsu.edu/measures.html) (Prochaska, Sallis, & Long, 2001) was used. Interclass correlation of .77 and correlation with accelerometer of .44 (p < .001) were reported for 144 culturally diverse youth with a mean age of 12 years. The average of the two items was used for analysis.

**Family support**
Four-item measures of family support were used for reduction in dietary fat, sedentary activity, and increased physical activity. Permission was obtained to use the measures found at [http://www.paceproject.org/Measures.html](http://www.paceproject.org/Measures.html). The dietary fat measure internal consistency was .75. The test–retest interclass correlation was .85. Family support correlated, p < .01, with dietary fat intake (Zabinski et al., 2006). Internal consistency in the current study was .86. A total mean score was calculated for analysis from items querying whether a member of their household (never to every day, 5-item Likert scale) provided low-fat foods, encouraged them to eat low-fat foods, ate lower fat foods with them, or told them they were doing a good job eating low-fat foods.

Family support for reduced sedentary time internal consistency was .86, and the interclass correlation was .76 (Zabinski et al., 2006; Zabinski, Norman, Sallis, Calfas, & Patrick, 2007). Internal consistency in the current study was .72. A total mean score was calculated for analysis from items querying whether a member of their household encouraged them to spend less time being sedentary (never to every day, 5-item Likert scale), discussed how sedentary habits can be unhealthy, helped them think of ways to reduce sedentary time, or told them they were doing a good job reducing their sedentary time.

The physical activity family support measure internal consistency was .73. The test–retest interclass correlation was .78. Family support correlated, r = .25; p < .001, with physical activity, supporting concurrent validity (Roesch et al., 2009). Internal consistency in the current study was .81. A total mean score was calculated for analysis from items querying whether a member of their household watched them participate in physical activity or play sports (never to every day, 5-item Likert scale), encouraged them, provided transportation, or did physical activity or sports with them.

**Food/Activity Parenting Practices Questionnaire (FAPPQ): Parent and student versions**
Authoritative parent feeding practices, exercise promotion, and sedentary activity diminution were examined with this 45-item instrument using a 5-item Likert scale format (parent .82–.84 and student .78–.88 alpha coefficients; Frenn et al., 2011; Steadman, 2006). Confirmatory factor analysis of the feeding portion of this instrument was found with parents (Kaur et al., 2006). In the current study, the mean parent subscale scores
used included (a) concern about child overweight (three items; \( \alpha = .84 \)); (b) responsibility for portions, type, and kinds of foods (three items; \( \alpha = .76 \)); and (c) monitoring of sweets and high-fat foods (two items; \( \alpha = .69 \)). The following subscales had low internal consistency and were not used in subsequent analyses: perceived control, restriction of foods and pressuring to eat, exercise monitoring, support, and control.

Subscales in the FAPPQ for students used in the current study included concern about their own weight (three items; \( \alpha = .85 \)), and perceptions of parental (a) concern about child overweight (three items; \( \alpha = .85 \)); (b) responsibility for food portions, type (two items; \( \alpha = .67 \)); (c) control of foods (two items; \( \alpha = .85 \)); (d) monitoring of sweets and high-fat foods (two items; \( \alpha = .69 \)); (e) help in deciding the type and amount of food (two items; \( \alpha = .87 \)); (f) monitoring, and decisional and instrumental support for physical activity (three items; \( \alpha = .75 \)); and (g) perceived parental control over the child's physical activity (two items; \( \alpha = .86 \)). Subscales for the perceived own control of weight and eating, responsibility for meals/snacks, choice and amount of food, parental restriction, and pressuring had low internal consistency, so they were not included in the analyses.

National Cancer Institute (NCI) Quick Food Scan
Parent modeling of the percentage of dietary fat intake was determined using the NCI Quick Food Scan (NCI, 2009). The instrument contains 15 items, with eight response options querying specific types of foods eaten over the past 12 months and two items regarding overall fat in diet with three response options. An algorithm was used to calculate percentage of dietary fat intake as a summated score. This instrument has been reported to correlate with a 24-hr diet history (Williams et al., 2008) in an intervention study (\( r = .45/.68 \) at baseline and \( .51/.58 \) at follow-up for women and men, respectively).

International Physical Activity Questionnaire (IPAQ)
Parent modeling of activity was measured using the IPAQ (n.d.; http://www.ipaq.ki.se/ipaq.htm). The seven items on the questionnaire query the number of days and minutes spent in vigorous or moderate intensity activity. Test–retest Spearman's rho = .96. Criterion validity was comparable with other self-report measures (Craig et al., 2003).

Procedures
Following review for protection of human subjects, the study was explained to parents as they waited for parent–teacher conferences in one school. In two schools where it was not possible to meet parents directly, the project was explained to students, and a packet with parent surveys and a stamped envelope was sent home for parent consent. A drawing for small gifts was offered for returned consents (whether Yes or No was endorsed). Students then provided written assent. Students completed paper-and-pencil surveys in the classroom. Height and weight were measured in privacy outside the classrooms. Follow-up e-mails and phone calls were made to remind parents who agreed to participate. A $25 gift card was offered for student/parent dyads that completed intervention components and $10 for those who completed only the measures.

Data analysis
Descriptive statistics and descriptive qualitative analysis were used to examine feasibility and summarize responses to open-ended questions. Multiple regression was used for RQ 2 in order to examine initial relationships among the variables, and generate an adjusted \( R^2 \) (in view of the small sample) from which an effect size could be determined for subsequent research. All regression equations were examined and found not to have tolerances of less than the recommended cutoff of .1 or variance inflation factors above 10 (Pallant, 2005). Change scores were calculated post–pre, so lower values indicated decreases, and higher values indicated increases for RQ 3 and 4.
Results

RQ 1. Feasibility

Please see Figure 2 for enrollment and retention details. Of the total 161 students and a parent for each student invited, no response was received from 98 parents. At the school where parents of fifth-grade students were contacted as they waited for parent–teacher conferences and packets with return postage were sent home to parents not attending, 27 parents (from a total of 52) provided consent and students provided assent (52% response). At two schools where the study was explained to seventh- and eighth-grade students, and a packet of information with return postage provided for parents, a total of 35 agreed out of 109 enrolled (30% response rate at public school; 36% at private, religiously affiliated school). Using chi-square, a significant ($p = .045$) difference was found between recruitment at parent–teacher conferences and by notes sent home with students at the public schools; no other differences were significant. From the three schools, a total of 50 parents and students completed pretest data (81% response rate).

Using chi-square, no significant ($p < .05$) differences were found between groups in CDC weight status, age, race, or gender. Reasons for declining the parent online program were as follows: “didn’t feel I needed it,” “not enough time,” “I never check my emails.” Nine parents who agreed to complete the online modules did not. An on-protocol analysis was used, so data for these dyads were included with the child online, parent instruments group for four dyads and neither online group for five dyads. Reasons for not completing included the following: “didn’t have time,” “Internet was not on sometimes.” All children assigned completed the online program as determined by the completion of modules online and a workbook. BMI data were available for 45 students (90% retention of sample) and 15 parents (30% retention) on posttest.

RQ 2. Variables related to child BMI, physical activity, and dietary fat intake on pretest

No relationships were found using hierarchical regression on step 1 for parent BMI, dietary fat intake, or physical activity in predicting the child’s pretest BMIp. On step 2, when parent perspectives regarding authoritative feeding constructs were entered, significant differences were not found in variance change, nor were any univariate predictors significant. As shown in Tables 1 and 2, no relationships were found for child dietary fat intake or physical activity in predicting the child’s pretest BMIp. The $R^2$ changes were significant when child perspectives regarding authoritative feeding or physical activity constructs, respectively, were entered in step 2. Child perspectives of family support for reduced dietary fat intake, increased physical activity, and reduced sedentary activity were added in step 3, resulting in no significant change in the variance explained.

Table 1. Hierarchical Multiple Regression Analyses Predicting Child BMI Percentile From Pretest Child Dietary Fat, Child Perspectives of Authoritative Parenting Regarding Feeding Behaviors and Child Perspectives of Family Support for Lower Dietary Fat

<table>
<thead>
<tr>
<th>Predictor</th>
<th>BMI percentile</th>
<th>$\Delta R^2$</th>
<th>$\beta$</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (Constant)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child % dietary fat intake</td>
<td></td>
<td>.005</td>
<td>.073</td>
<td>.640</td>
</tr>
<tr>
<td>2 (Constant)</td>
<td></td>
<td></td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Child % dietary fat intake</td>
<td></td>
<td>-.005</td>
<td>.973</td>
<td></td>
</tr>
<tr>
<td>Child concern about own overweight</td>
<td></td>
<td>.331</td>
<td>.053</td>
<td></td>
</tr>
<tr>
<td>Child perceived parent concern about child overweight</td>
<td></td>
<td>-.106</td>
<td>.558</td>
<td></td>
</tr>
<tr>
<td>Child perceived parent responsibility for food portions, type of food</td>
<td></td>
<td>-.318</td>
<td>.073</td>
<td></td>
</tr>
<tr>
<td>Predictor</td>
<td>BMI percentile</td>
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<td>--------------------------------------------------------------------------</td>
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<tr>
<td></td>
<td>ΔR²   β        Sig.</td>
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<td></td>
</tr>
<tr>
<td>1 (Constant)</td>
<td>.000  .000    .999</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child total weekly physical activity</td>
<td>−.108 .477</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Child concern about own overweight</td>
<td>.282  .112</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child perceived parent concern about child overweight</td>
<td>.101  .546</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child perceived parent monitoring of amount, providing decisional</td>
<td>−.442 .035*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>and instrumental support for physical activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child perceived parent control over child’s physical activity</td>
<td>.557  .004**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>.307  .004**</td>
<td></td>
<td></td>
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<tr>
<td>2 (Constant)</td>
<td>.001  .001</td>
<td></td>
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<tr>
<td>Child total weekly physical activity</td>
<td>−.128 .426</td>
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<tr>
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<td>.307  .004**</td>
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<td>3 (Constant)</td>
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<tr>
<td>Child total weekly physical activity</td>
<td>−.121 .537</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child concern about own overweight</td>
<td>.278  .130</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child perceived parent concern about child overweight</td>
<td>.100  .562</td>
<td></td>
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</tr>
<tr>
<td>Child perceived parent monitoring of amount, providing decisional</td>
<td>−.445 .048*</td>
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<tr>
<td>and instrumental support for physical activity</td>
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<tr>
<td>Child perceived parent control over child’s physical activity</td>
<td>.547  .011*</td>
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<tr>
<td>Child perceived family support for physical activity</td>
<td>−.017 .942</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Child perceived family support to reduce sedentary activity</td>
<td>.037  .842</td>
<td></td>
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</tbody>
</table>

Note: *p < .05; **p < .01. BMI, body mass index.

Table 2. Hierarchical Multiple Regression Analyses Predicting Child BMI Percentile From Pretest Child Physical Activity, Child Perspectives of Authoritative Parenting Regarding Physical Activity Behaviors, and Child Perspectives of Family Support for Physical Activity and Reduction of Sedentary Activity

<table>
<thead>
<tr>
<th>Predictor</th>
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<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Note: *p < .05; **p < .01. BMI, body mass index.
RQ 3. Relationships of changes in parent and child variables to changes in child BMI, physical activity, and dietary fat intake

Across groups over the duration of the study, parental increase in physical activity correlated with an increase in child physical activity ($r = .41; p = .04$). There were no correlations between parent and child perceptions of authoritative parenting on the same subscale on pretest. Parent and child changes in perception regarding parental responsibility for child food choices and amounts correlated across groups over the course of the study ($r = .46; p = .04$). Changes in parent perceptions of responsibility also correlated with children's perceptions of parent food monitoring of sweets and high-fat foods ($r = .57; p = .007$), help in deciding what and how much to eat ($r = .64; p = .003$), and control over the child's eating ($r = .76; p < .001$).

Across groups over the study interval, increased child concern about their weight correlated with increased dietary fat intake ($r = .36; p = .02$), while increasingly perceiving their weight as higher correlated with increased activity ($r = .38; p = .03$). Increased child perceptions about parental control regarding physical activity correlated negatively with change in activity ($r = -.44; p = .004$), and regarding diet correlated with increased dietary fat intake ($r = .43; p = .007$). No correlations with BMIp change were found in this sample.

RQ 4. Initial efficacy of parent, child, or combined interventions

Changes in child BMIp, parent BMI, percentage dietary fat intake, and physical activity were analyzed by group using analysis of variance. A per-protocol analysis, wherein those actually receiving the indicated treatment were included (Polit & Beck, 2011), did not yield significant differences with this sample size. Changes in parent BMI and child BMIp by group are shown graphically in Figure 3.

Figure 2 CONSORT Diagram of Recruitment and Retention.
Note: BMI, body mass index; CONSORT, Consolidated Standards of Reporting Trials.
Figure 3  Graphic Representations of Parent BMI and Child BMI Percentile Changes by Group. 

Note: Change scores were calculated post–pre, so lower bars indicate decreases, and higher bars indicate increases. Listwise deletion was used for the chart. BMI, body mass index.

Discussion

Findings from this study demonstrated that parents and children could be recruited, would complete measurement of study variables, were willing to be assigned to groups, and completed the assigned protocol. The study was limited in that a large number of parents did not respond to the invitation to participate. Further limitations included lack of Internet access, which resulted in one parent not willing to participate, and variable Internet access, which prevented one parent from completing the parent modules. There appeared to be confusion on the part of parents regarding the request for their height and weight data (some provided their children’s data), and the study was further limited by parents not completing their BMI data.

Feasibility

Clearly, recruitment was almost twice as effective when it was possible to meet parents attending parent–teacher conferences as compared with only sending information home with students. Recruitment was somewhat higher in the religiously affiliated as compared with the public school. It could be that an incentive for the school or a higher incentive for the parent/child dyads would improve the response rate (Janicke et al., 2008; Potter et al., 2011).

Retention

The 90% retention rate for students, 74% of the parents assigned to the parent and child online group, and 62% of the parents assigned to the online intervention when they would have been the only agent of change (their children just completed instruments) were better for students and similar to parent retention reported. In a group-delivered intervention, one third of the obese children and their parents did not complete the study, although in that intervention, $50 was provided at each follow-up assessment and $5 for travel to each of the 12 intervention sessions (Janicke et al., 2011). Hence, it will be important to plan for noncompletion in determining the sample size for these intervention groups in subsequent studies. Loss to follow-up varied from 6% to 17%, which is similar to the 12–15% reported by a study of an online intervention in 12- to 13-year-old students in the Netherlands over a 2-year period (Ezendam, Brug, & Oenema, 2012). It is important to note that despite differential participant remuneration in the current study, attrition did not vary by control and experimental groups.
Relationships of variables to child BMI on pretest

A striking finding of the present study was that diet and exercise did not predict a significant amount of the variance in children's BMI. Children's perspectives on authoritative parent feeding behavior accounted for an additional 41%, and perspectives regarding physical activity accounted for an additional 31% of the variance in their initial BMI, as compared with nonsignificant models when their dietary fat intake and physical activity were included. Because a number of parents did not report their BMI across all groups, this could reduce the significance of this variable in determining relationships with the child BMI. However, even when complete data with measured BMI were used for both parents and children in a larger study (N = 176), authoritative parenting explained an additional 45% of the variance in child BMI after controlling for ethnicity, socioeconomic status, and parent BMI (Polfuss & Frenn, 2012a).

As shown in Tables 1 and 2, children's perceptions of parent control over the child's eating and physical activity related to higher BMI. In contrast, parent help in deciding what and how much to eat, as well as providing decisional and instrumental support for physical activity, related to lower BMI. Parent-perceived control was also associated with higher child BMI (Kaur et al., 2006). Parent responsibility for providing healthy food and activity opportunities, and allowing the child to develop skills in making choices by choosing from among the opportunities is an important distinction to make with parents. Parents who choose for their children use control in a way that is associated with higher child BMI. It may be that a larger sample size and the use of a 24-hr diet history, rather than the shorter food frequency measure used in the current study, would reveal correlations of diet with BMI and authoritative feeding behaviors similar to those previously reported (Hennessy, 2011).

Correlations of changes in constructs over time

Within the current study, an increase in parental physical activity correlated with an increase in child physical activity. It is important to inform parents and children that increasing physical activity may help them both. Parent and child's perspectives about parent responsibility for child food choices and amounts correlated across groups over the course of the study.

Intervention components to reduce children's perspectives of being controlled need to be included because this was associated with higher BMI on pretest, and reduced activity and higher dietary fat intake across the duration of the study. It is also important for children to have an accurate understanding if their BMI is increasing because this was correlated with increased levels of physical activity, whereas increases in child concern about their weight meant they unfortunately increased their dietary fat intake.

Group differences in parent and child BMI

The trends in response to the interventions in Figure 4 demonstrate the need for a larger study. Although the pilot study sample size was not sufficient to examine between-group differences in changes of BMI, physical activity, or dietary fat intake, these data were useful in determining sample sizes needed for adequate statistical power in future research. The total sample needed for the power of .80, alpha of .05 for child BMI change (Cohen's $f = .25$), would be 180; for total activity (Cohen's $f = .47$), the sample size needed would be 56; and for dietary fat intake (Cohen's $f = .1005$), the sample size needed would be 1,084 (Erdfelder, Faul, & Buchner, 1996). The high number of subjects needed to examine change in dietary fat intake is similar to the findings from an Australian randomized controlled trial examining parental and child-focused interventions to reduce child BMI in 7- to 9-year-old children (Burrows, Warren, Baur, & Collins, 2008). If a cluster randomized controlled trial was used, wherein subjects were selected from randomized classrooms, statistical dependency would need to be addressed (Campbell, Donner, & Klar, 2007; Donner & Klar, 2000). Sample sizes required for sufficient power to examine differences by group depend on the number of subjects recruited per classroom and the number of classrooms, so that would range from 180 to 520.
Conclusions

Based on the findings of this study, the conceptual model we originally proposed (see Figure 1) should be reconsidered and further studied. The results of this study showed direct effects of authoritative parent feeding and physical activity behaviors on children's BMIp. No effects were found for physical activity, dietary fat intake, or social support. Different measures of physical activity and diet may yield different results.

How might this information affect nursing practice?

Findings from this study support the importance of authoritative parent feeding and physical activity behaviors in addressing the childhood obesity pandemic. Nurses can intervene effectively by providing clear explanations of parent responsibility for providing healthy food and activity opportunities. Parents can then be coached in allowing the child to develop skills in making choices. Nurses can help parents make the distinction that parents who choose for their children use control in a way that is associated with higher child BMI. Parents who increase their own activity have children who do so as well. Nurses should help children accurately understand how their BMI is changing, so that children can increase activity rather than eat too many high-fat foods.

Online intervention programs can be easily integrated and implemented in nursing practice, and have been shown to be effective. Nurses can introduce families to this form of intervention and contract with them to follow progress. Although not all parents will participate, those who do may make a powerful difference in preventing their children's BMI increase. Until more parents can be involved, it may be that nurses need to intervene with children, incorporating ways for children to interpret parenting approaches in ways that help them engage in health promotion.

References


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