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Modifiable family factors among treatment seeking families of children with high BMI: Report of a pilot study

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Abstract

Purpose—The purpose of this pilot study was to explore parenting style and other potential family and social indicators of an obesogenic or weight-promoting family environment. Modifiable factors were sought on which to base a nursing behavioral intervention that could be combined with diet and exercise to reduce youth weight.

Methods—Twenty-eight parents and their 9 to 18 year old youth who were seeking care for overweight responded to in-home surveys to characterize parenting style (warmth/responsiveness and control). We also examined the extent to which parent modeling of health behavior, child feeding practices, parent knowledge of nutrition, and family social characteristics differed by the control aspect of parenting style.

Findings—Nearly all youth and parents reported substantial parental love (responsiveness) suggesting little variability in the warmth aspect of parenting style. In contrast, there was considerable variability in the control (moderate versus high) aspect of parenting style. Large effect sizes indicated that mothers with moderate control perceived their lifetime weight to be higher, had more concern about their youth's weight ($p = 0.03$), better knowledge of nutrition, and lower BMI ($p = 0.02$) than mothers with high (firm or restrictive) control. Moderate effect sizes indicated that mothers with moderate control demonstrated better modeling behavior, higher perception of youth weight, practiced less pressure to eat, and had youth with lower BMI and percent body fat than mothers with high (firm or restrictive) control. Families who volunteered for study kept their data gathering appointments but we recommend a recruitment period of more than four months and the inclusion of several referral sites.

Implications—Further study of how parent control is related to youth overweight and how appropriate control can be achieved among families with teens who are overweight is recommended.

We performed a pilot study to identify and understand factors contributing to an obesogenic or weight-promoting family environment among parents and their nine-to-18 year old youth who were seeking care for youth overweight at a Midwestern pediatric clinic. Our goal was to document modifiable factors for potential development of a behavioral intervention that would complement nutrition and exercise therapies to reduce teen weight. In addition to understanding family factors, we sought to characterize the feasibility of recruiting participants and the logistics of working with clinic families on a behavioral intervention.

From the literature, we reasoned that an important modifiable family factor was parenting style (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). We reasoned further that parent modeling behavior (Golan & Weizman, 2001), child feeding practices (Birch & Davison, 2001), parent knowledge of nutrition (Caballero, 2004; Gibson, Wardle, & Watts, 1998), and social factors (Chen & Kennedy, 2004; Delva, O'Malley, & Johnston, 2006) should be examined within the context of parenting style. The framework guiding this study is displayed in Figure 1.

Our methods included survey and focus groups. This paper describes the survey findings and answers the following research questions:

1. What are the predominant parenting styles among parents seeking clinical treatment for youth overweight?
2. To what extent do family environment variables including parent modeling, youth feeding practices, and knowledge of nutrition differ by parenting style?
3. To what extent do family social characteristics including parent and youth gender, body mass index (BMI), body composition, race, and ethnicity; and parent education, income, occupation, and partner status differ by parenting style?
4. How feasible is recruiting clinic families for study and what logistics contribute to their participation in the study?

Background and Literature Review

Youth overweight and obesity, referred to as high body mass index (BMI) in this paper (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010), presents a serious challenge to the health of the population. The consequences of high BMI for youth are compelling physically, emotionally, and socially. Heritability of BMI is substantial, but the dramatic increase in high BMI prevalence among youth highlights the importance of environment (Wardle, Carnell, Haworth, & Plomin, 2008). Because youth are socialized and develop lifelong behaviors within the family, high BMI is a family health issue.

One factor in the family environment is parenting style - a constellation of attitudes toward the youth that create an emotional climate in which the adults' behaviors are expressed. These behaviors include parenting practices - the specific goal directed activities adults perform to carry out their duties and the non-goal directed activities - gestures, tone of voice, and spontaneous emotional expression (Darling, 1993). Baumrind (1968) created the seminal conceptualization of parenting style. Forty years of research has produced a remarkably consistent picture that responsive (warm) and demanding (control) parenting exemplified by encouragement of pro-social behavior, setting limits, monitoring, problem solving, and positive involvement is conducive to the successful socialization of children. Researchers have demonstrated that parents who combine clear expectations of youth accountability with warmth and support have more success in curbing risk behavior than overly strict or indulgent parents (Baumrind, 2005). Parenting style in families with high BMI youth is gaining attention (Kitzman & Beech, 2006).

Another factor associated with high BMI among youth is parent modeling behavior. Modeling includes portion sizes and frequency and timing of meals and snacks (Birch & Davison, 2001; Robinson, Kiernan, Matheson, & Haydel, 2001). Parents matter and their behavior significantly influences youth behavior even into adolescence (Chia-Chen Chen & Thompson, 2007). Parent's TV viewing habits and propensity toward physical activity or sedentariness was reflected in youth TV viewing habits and level of physical activity (Barradas, Fulton, Blanck, & Huhman, 2007; Pugliese & Tinsley, 2007; Regber, Berg-Kelly, & Marild, 2007). The eating and activity habits established in the family, such as eating and

exercising together, knowledge of nutrition concepts, and purchase and preparation of nutritious foods are other important family factors (Golan, Fainaru, & Weizman, 1998).

Social factors provide a context for families with high BMI youth. Gender and race and ethnicity (Arredondo et al., 2006; Delva, et al., 2006), parent overweight status (Faith, Scanlon, Birch, Francis, & Sherry, 2004), parent education level, and marital status are documented in the literature as associated with a likelihood of having high BMI youth (Birch et al., 2001). Low income families tend to report difficulties securing nutritious, fresh foods, rate their communities non-aesthetic for physical activity, and lack access to transportation and recreational facilities (Boehmer, Lovegreen, Haire-Joshu, & Brownson, 2006). Poverty has been associated with overweight and obesity in adults and youth (Lopez & Hynes, 2006). Golan (2006) reported that the greater the family size the greater the number of obesogenic foods and the smaller the family size the greater the level of physical activity.

Based upon the literature, we reasoned that the important modifiable family factors were parenting style (Hughes, et al., 2005), parent modeling behavior (Golan & Weizman, 2001), child feeding practices (Birch & Davison, 2001), and parent knowledge of nutrition (Caballero, 2004). Further, we reasoned that selected family social factors should provide the context of the modifiable factors. The framework guiding this study is displayed in Figure 1.

Methods

Design

The design for this study was a cross sectional descriptive survey.

Sample

The inclusion criteria for the youth were: (a) English speaking, (b) between the ages of nine and 18, and (c) diagnosed as overweight by a healthcare provider. Overweight was defined as a BMI at or above the 85th percentile for adolescents of the same age and sex. (<http://www.cdc.gov/obesity/childhood/basics.html>).

Variables and their Measurement

Parenting Style was measured with the Parental Acceptance-Rejection Questionnaire/Control (PARQ/Control) (Kim & Rohner, 2002), a 73-item, global, self-report measure of parental acceptance/rejection and parental control. The PARQ/Control has a youth and a parent version, the difference being the target of the items – youth or mother/father. The PARQ/Control has been used in more than 230 studies and extensive international evidence shows it to be psychometrically sound (Kim & Rohner, 2002). According to Rohner (personal communication 1/8/08), if the Child PARQ/Control is in the youth's first language it can be administered from grade 3 on.

Parent Modeling Behavior was measured with the 29-item Family Activity and Eating Habits Questionnaire (FAEHQ) (Golan & Weizman, 1998). The FAEHQ assesses four factors associated with weight gain and loss in children: activity level (4 items), stimuli in the environment (8 items), eating related to hunger (4 items), and eating style (13 items). Items are summed for a total score; the higher the overall score, the less healthy the behaviors. The FAEHQ has undergone substantial testing to establish validity and reliability. Because the FAEHQ was developed in Israel, with the author's permission (personal communication 6/17/08), minor modifications were made to reflect American culture. For example, the term "wafer" was changed to "candy bar."

Youth Feeding Practices were measured with the 31-item, Revised Child Feeding Questionnaire (R-CFQ) (Birch, et al., 2001; Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). The scale is composed of seven sub-scales: *Responsibility for Feeding*, *Perceived Parent's Weight*, *Perceived Youth's Weight*, *Concerns for the Youth's Weight*, *Food Restriction*, *Pressure to Eat*, and *Monitoring of Food Intake*. Subscale scores are the result of item summations. The R-CFQ has been used in numerous studies since 2001 and has adequate reliability and validity. Factor analysis confirmed the seven-factor model fits the data well in two separate non-Hispanic white samples and with minor modification also fits a Hispanic sample (Birch, et al., 2001).

Parent Knowledge of Nutrition was assessed with one item, "My knowledge of food and nutrition is." Adults were instructed to choose from a four-point scale of Very High, High, Low, or Very Low adapted from work by Gibson et al (1998).

Social characteristics including parent height and weight, education, income, occupation, number of persons in the family, race and ethnicity, gender, age, and partner status were assessed by self-report. Youth self-reported race, ethnicity, and age. Participants who reported they were Hispanic and/or their race to be African American, Native American, Asian American, or Native Hawaiian were classified as having 'minority status.' Family income and number of persons in the family was used to determine poverty status.

Youth BMI was determined by the clinic height and weight measures. Body composition was determined using the clinic values obtained through dual-energy x-ray absorptiometry (DXA) (GE Medical, Madison, WI).

Procedure

All study procedures were reviewed and approved by the University's Health Science Institutional Review Board. Each adult provided written informed consent and the youth provided signed assent.

Recruitment—All parents and youth seen by a healthcare provider at a Midwestern pediatric medical clinic from January 2009 through April 2009 were informed about the study by a nurse employed at the clinic and paid through the study. Dyads (a parent and youth) who demonstrated interest were contacted by phone to confirm eligibility and explain study procedures. In April, 2009, announcements at another primary care clinic were used to attract participants. These individuals called the research office directly. A meeting to complete the data collection was scheduled at the family home or another private place of their choice.

Data Collection—The parent, either the mother or father, completed surveys using paper and pencil. The youth completed surveys using a PDA (personal data assistant).

Data Analysis—The parent survey data were entered and the youth data were transferred from the PDA to a secure server for data analysis. There were very few missing data and were missing at random. When missing data occurred in a scale that was scored by summation, the number of items responded to served as the denominator. All data were analyzed for frequency distribution. For continuous data, effect sizes to determine the magnitude and direction of differences in the means and exact confidence intervals were calculated. For the categorical data, effect sizes to determine the magnitude and direction of the differences in proportions and exact confidence intervals were calculated. Consistent with Cohen (1962), effect sizes from 0 to .30 were considered small, .31 to .69 were considered medium, and above .70 were considered large. All scales were assessed for reliability; the coefficients are displayed in Tables 2 and 4.

Results

Description of the Sample

Table 1 contains a description of the sample. The parent sample consisted of 24 mothers and four fathers with a mean age of 44 years ($SD = 7.2$) who mirrored the clinic population with respect to race and ethnicity. Half were married and most had a post-secondary education and were employed with an income above \$50,000. Their reported knowledge of nutrition was high ($M = 3.21$, $SD = 0.57$) and the average self-reported BMI was 30.75 ($SD = 7.22$).

Of the youth, two thirds were male, the mean age was 13 years ($SD = 2.4$), and 79% self-reported being non-Hispanic, European American. Many youth reported two or more races and some were not consistent with their parent's reported race. The mean grade in school was 7th. All youth self-reported their height and weight, and all but four youth also had a clinic reported height and weight. These four youth responded to the announcement at another primary care clinic and we were unable to gain access to their measured BMI. A linear regression equation was used to project scores for the four youths without the clinic-reported BMI and the mean youth BMI was 32.78 ($SD = 6.6$). The clinic reported BMI and four projected scores were used in the analysis. The mean percent body fat was 38.49 ($SD = 5.76$). DXA values were not available for one youth whose weight was greater than 300 pounds or for the youth recruited from the second primary care clinic.

Research Question One

What are the predominant parenting styles among parents seeking treatment for youth overweight? Scores demonstrated high warmth and affection and low hostility/aggression, indifference/neglect, or rejection. The overall measures showed a tendency to high acceptance and high control (See Table 2).

As displayed in Table 3, substantial parental love was perceived by most of the parents and youth. All of the parents perceived themselves, 83% of youth perceived the mother, and 59% of youth perceived the father as displaying substantial parental love. On the control subscale, 38% of the parents rated themselves and 48% of the youth rated both the mother and the father as moderate in control. Sixty-two percent of the parents rated themselves, 47% of the youth rated their mothers, and 17% of the youth rated their fathers as high (firm or strict/restrictive) in control. Finally, no parents perceived that they were lax in control. One youth perceived the mother and three youth perceived the father as lax in control.

Distribution of Study Variables

See Table 4 for a description of the distribution of parents' scores on each measure. The parents' modeling behavior (FEAHQ scores) had variability, but the mean and standard deviation indicate an overall adequate pattern of physical activity and eating style. On the child-feeding questionnaire, parents' R-CFQ mean scores were above the midpoint on all the subscales with the exception of the pressure to eat subscale. The scores indicate parents did not pressure their youth to eat, but did tend to practice food restriction. The alpha coefficient was less than 0.59 for two of the subscales (responsibility for feeding and parents perceived weight).

Research Question Two

Only four of the parents who completed surveys were fathers. Potential gender-specific issues surrounding parent behavior, parent characteristics, and parenting style could not be addressed adequately with only four fathers in the sample. Therefore, we examined data from mothers only for analyses of Research Questions 2 and 3. There also was little variability in the substantial love dimension, thus, analyses of research questions two and

three are limited to the parent control dimension. Parent control was limited further to mother's perception and was characterized as moderate or high (firm, strict/restrictive).

To what extent do parent modeling behavior, youth feeding practices, and knowledge of nutrition differ by parenting style?

Displayed in Table 5 and Figure 2 are the data to support the findings. Differences were calculated by subtracting the mean scores (raw data Table 5) for mothers with high control from the mean scores for mothers with moderate control. Confidence Intervals that do not include the zero line are statistically significant.

Large effect sizes indicated that mothers with moderate control perceived their lifetime weight to be higher, had more concern about their youth's weight ($p = 0.03$), and better knowledge of nutrition than mothers with high (firm or restrictive) control. Moderate effect sizes indicated that mothers with moderate control demonstrated better modeling behavior, higher perception of youth weight, and practiced less pressure to eat than mothers with high (firm or restrictive) control.

Research Question Three

To what extent do the demographic characteristics of parent education, youth and parent BMI, youth body composition, and parent minority status, poverty status, and partner status differ by parenting style? As indicated in Table 5 and Figure 2, mothers with moderate control reported a significantly lower BMI ($p < 0.02$). Though not significant, mothers with moderate control tended to have youth with lower BMI and lower percent body fat than mothers with high control. Education was equivalent for mothers with moderate and high control.

Differences in proportions, effect sizes, and exact confidence intervals were used to analyze the categorical data (minority, partner, and poverty status). Mothers with moderate control were significantly less likely to be of minority status ($p = 0.016$ (exact)). There were no mothers of minority status with moderate control scores. Findings were not significant for partner or poverty status (Table 5).

Research Question Four

How feasible is recruiting clinic families for study and what logistics contribute to their participation in the study? Approximately 150 parents and children visit the pediatric clinic each year. No research had been conducted in this clinic since its inception in 2006, thus, we were unsure how many of the families invited would actually respond and follow through on an invitation to participate. Further, the timeline for data collection was four months. Clinic staff advised us that it was feasible to recruit 60 parents and children. Sixty dyads indicated interest in the study. Of these, 15 could not be reached after three attempts and 45 were screened for eligibility. Seven were not eligible either for age or weight, nine refused, and 28 agreed to participate and provided informed consent. All families who indicated interest and made an appointment with the data collector kept their initial appointments.

Discussion

Summary

This study was designed to identify and understand factors contributing to an obesogenic or weight-promoting family environment among parents and their nine-to-18 year old youth who were seeking care for youth overweight at a Midwestern pediatric clinic. We explored parenting style and how parent modeling behavior, child feeding practices, parent

knowledge of nutrition, and social factors differed within the context of parenting style. Our findings showed that nearly all the parents and most the youth perceived substantial feelings of love, or high responsiveness. This finding is congruent with parents seeking treatment for their teen at a specialty clinic. A third of the parents and just under half the youth perceived the parents to be moderate in control. Two thirds of the parents and just over half the youth perceived the parents to be low, firm, or strict/restrictive in control. Minority mothers were more likely than non-minority mothers to be high in control. Mothers with moderate control demonstrated significantly less concern about the youth's weight and a significantly lower BMI than mothers with high control. That moderate control is more desirable than lax, firm, or strict control as suggested by parenting style scholars (Baumrind, 2005; Steinberg, 2001) was demonstrated by the direction and magnitude of the effect sizes. That the control aspect of parenting style demonstrated variability, while the responsive aspect did not is one unique contribution this paper makes to the literature.

To improve validity of our analysis despite the small sample size, we report effect sizes because effect sizes are not dependent upon sample size. Examining the relative magnitude of the effect sizes, we report a minimum of .08 to a maximum of 1.23. In terms of mother's modeling behavior, the means among moderate and high control differed, but the standard deviations were large, resulting in a moderate effect size and a non-significant finding. In terms of child feeding practices, moderate and high control mothers did not differ significantly except for concern about youth weight. Social factors provided the most interesting findings. BMI between moderate and high control mothers differed by more than 8 points – a considerable difference. No minority mother's control scores placed them in the moderate category; all minority mothers were in the high control category.

Consistency with the literature

The literature is consistent that warm and responsive parenting is conducive to positive youth health and development outcomes. Parenting that is harsh or cold is associated with negative outcomes. Lack of parent warmth and responsiveness in youth overweight may be an area for future research.

There is a literature that posits high parent control, expressed in an authoritarian parenting style, is more predominant among minority families (Steinberg, Blatt-Eisengart, & Cauffman, 2006). It is thought that because minority families may reside in less safe areas than those in which majority populations reside, a more demanding, controlling style is needed to keep children and youth safe (Domenech Rodriguez, Donovan, & Crowley, 2009). It is often stated that parents tend to parent as they have been parented. Thus, whether the residential area is safe or not, a controlling, authoritarian style may be sustained in minority families (Greening, Stoppelbein, & Luebke, 2009). Though our sample reflected the proportion of minority families enrolled at the clinic, the number of minority mothers is small and was clustered because there were not enough persons in each category to analyze separately. Therefore, the finding that minority mothers tend to be high in control should be interpreted with caution.

Minority status may act as a proxy for socio-economic status, particularly with respect to family residence. Of the three mothers whose family income placed them in the poverty category, two were European American and one was Native Hawaiian. We do not believe that minority status was a proxy for socioeconomic status in this study.

The literature is inconsistent about the role of parent control in youth overweight. Younger children may require a higher degree of parental control than older youth to make healthful food choices and portions. Older youth are less likely to appreciate parent control and, as such, avoid adherence to food and exercise restrictions or suggestions. Teens may perceive

parental influence as pressure, unnecessary, and negative, decreasing the likelihood of complying with parent requests (Lessard, Greenberger, & Chen, 2010). Parental demandingness without responsiveness may undermine internalization of values (Lewis, 1981). Pressure tactics, even in the presence of a warm relationship, resulted in negative effect and behavioral resistance in a study of parental efforts to influence eating habits of teens (Lessard, et al., 2010). Yet, there is literature, based on developmental theory, that adolescents desire adult involvement and closeness (Chia-Chen Chen & Thompson, 2007). Most likely, mothers exhibiting high control are doing what they think is best but may be off-putting their teen.

Interestingly, though authoritative parenting is defined as high responsiveness and high control, there may be a 'too high' control. The PARQ/Control can be used to classify parenting styles into Baumrind's (1971) categories of authoritative, authoritarian, or permissive. However, when doing so with our sample, 15 (53.6%) parent perceptions, 17 (60.7%) youth perceptions of mother, and 16 (57.1%) youth perceptions of father did not fit into any of the categories. According to Rohner in a personal communication (18-September, 2009), other researchers also have found this to be true, suggesting that using the Baumrind categorization may disregard youth at risk for a variety of developmental problems- behavioral, psychological, and physical. Rohner went on to state that Baumrind's categories also leave out high warmth/acceptance and strict behavioral control, as well as rejection and firm control. Therefore, responsiveness or acceptance should be determined separately from demandingness or control (Kim & Rohner, 2002).

The PARQ/Control likely focuses upon psychological control, that is, the regulation of youth's feelings and thoughts (Barber, 1996). Parental control of practices surrounding youth overweight likely focuses upon behavioral control, that is, the management of youth behavior and activities (Steinberg, 2001). It may not be possible to separate psychological and behavioral control completely but youth have clear beliefs about when they versus their parents should have psychological or behavioral control (Smetana, 1995).

The role of parent control was evaluated in a recent genetic study of adolescent overweight. A team of Dutch investigators reported that child-rearing experiences and emotional eating might be dependent on genetic make-up. They reported a moderator effect of the dopamine D2 receptor (DRD2) genotype on the relation between both maternal and paternal psychological control and emotional eating among youth of both sexes. Adolescents only showed an increase in emotional eating in relation to high psychological control, if they carried at least one DRD2 A1 allele (van Strien, Snoek, van der Zwaluw, & Engels, 2010). The role of control in parenting needs additional scrutiny.

Our parent sample demonstrated considerable variability in perceived control. Other investigators have documented that parent control that is either too lax and or is too firm, strict, or restrictive is associated with child overweight. This finding occurred among younger children, elementary school aged children, and adolescents (Berge, Wall, Loth, & Neumark-Sztainer, 2010; Birch & Davison, 2001). We measured global parenting style; but studies indicate that parenting practices tend to vary with context. Parents may exhibit control with respect to eating but not in other contexts.(Costanzo & Woody, 1984). Too little or too great parent control is a potentially modifiable factor that may contribute to overweight youth behavior change. Therefore, we promote a curvilinear view of parent control as best for parent practices with youth who are overweight. Based on the literature and the data reported here, the control/demandingness dimension of parenting style needs further study

Future

Further study of the control aspect of parenting style is warranted. How can parents learn strategies of more effective/appropriate control? Several investigators have included strategies in their interventions.

Golan (2006) takes a strong stance about parent control. She places responsibility for child health and development, including propensity for overweight, squarely with the parents. She developed a curriculum to address nutrition, physical activity, and behavioral strategies to reduce youth overweight. It is directed at the parent only. She expects both parents to attend all sessions of the curriculum. She expects them to gain knowledge in nutrition, healthy eating patterns and styles, and physical activity and to set a climate of high expectation for child follow through. By increasing parent control, she has demonstrated consistent outcomes for child weight loss and maintenance. Expanding or adapting this intervention to adolescents may be warranted.

Other investigators (Stein, Epstein, Raynor, Kilanowski, & Paluch, 2005) include both parents and youth in any strategy to reduce weight. Thus, an important consideration in developing an intervention is the target of the intervention – parent only, parent and youth, youth only, or a combination of targets. Acknowledging the bi-directional nature of parent youth interactions, interventions aimed at changing parenting behavior may be more successful if the youth is involved with the parent (Patterson & Forgatch, 1985).

Some may think that intervening with parenting strategies when youth are teens is too late because patterns are set or there are too many intervening variables. Others have demonstrated that when parent behavior changes in specific ways, so does youth behavior, even among teens (Forgatch & Patterson, 2010).

Should a new intervention be developed to teach parents how to learn appropriate demandingness and to practice moderate control? Numerous family-based interventions exist that focus upon behavior modification, behavioral therapy, and problem solving to assist parents with youth weight loss (Berry et al., 2004; Epstein, Paluch, Roemmich, & Beecher, 2007; Saelens et al., 2002; Tyler & Horner, 2008; Whitlock, O'Connor, Williams, Beil, & Lutz, 2010). Programs primarily target families with younger children (under 12 years old). Though a few target families with teens (Johnson et al., 1997; Kirschenbaum, Harris, & Tomarken, 1984; Mellin, Slinkard, & Irwin, 1987; Saelens, et al., 2002; White et al., 2004). Authoritative parenting has been correlated with numerous positive health and developmental outcomes (Steinberg, et al., 2006). Parenting practices likely vary within the context of parenting style (Golan & Crow, 2004). We identified no intervention for adolescent overweight that assessed or focused on parenting style as a target of change (Kitzman & Beech, 2006). We think parents who seek primary or specialized care for their overweight teen may benefit from an intervention emphasizing skills in moderate-control parenting practices. We argue an intervention targeted to parents of high BMI youth and tailored to parents who are non-authoritative is needed.

Limitations

The chief limitation of the study is the sample size. The four-month timeframe was too short and though we expanded to a second site for recruitment late in the study we primarily used only one site for recruitment. A longer recruitment period and additional sites would improve sample size.

The composition of the sample is also a limitation. There were too few fathers in the sample to adequately analyze and interpret potential gender-specific issues surrounding parent modeling, feeding practices, and social factors. That mothers overwhelmingly comprise

research samples is not surprising given mothers predominantly accompany youth to healthcare appointments. Fathers have substantial influence on youth health and development (Bronte-Tinkew, 2006; Bunker, 2008) and the lack of understanding of their perspective is a serious void in the literature. Though the sample reflected the clinic population with respect to race and ethnicity, there were few minorities. Youth and parent report of race in some cases was not consistent. The youth may have had parents of different races, may have been adopted, or may not have understood the question. How youth perceive their race may be an interesting topic for future study. Finally, our study was consistent with the literature that family-based programs tend to attract middle and high socio-economic status families (Saelens, et al., 2002).

There were also some limitations to the measures. The R-CFQ (Birch, et al., 2001) was not designed for, nor has it been used with youth aged nine-to-18. We selected it because it was widely used in the literature. All but two of the subscales demonstrated adequate reliability. The developmental level of the youth may present a probable reason for the less than adequate reliability of the two subscales. A scale relevant to teen-feeding practices is recommended for future research.

We selected the PARQ/Control because it had youth and adult versions. However, it was difficult to interpret and score relevant to the three parenting styles and some of the items were sensitive, such as, "Hits me even when I don't deserve it." Such sensitive items resulted in our IRB requiring completion of the child PARQ/Control in the presence of professional research staff (nurse, social worker). Future investigators should examine other available scales for use focusing upon behavioral control.

The cross sectional nature of the study design limits our ability to make any inferences about how parenting style may vary over the course of treatment for youth overweight.

Our IRB requires that clinic staff approach families with opportunities for research participation. This practice could potentially be viewed as mild coercion, since families may want to please the clinic staff by participating. However, clinic staff did not know which families participate and we so informed the families.

Conclusion

We found most youth and all parents perceived substantial parental love or high parental responsiveness. The variability in parenting style among this sample was in the control or demandingness aspect of parenting style. Parent control or demandingness may be a modifiable factor to address in teen overweight and a potential target for intervention.

Minority status, concern for child weight, and the mother's BMI differed among mothers with moderate control when compared with mothers with firm or strict control. These three factors may be useful as investigators plan studies to intervene with overweight adolescents and their families. Multiple sites and several months are needed to recruit an adequate sample. Discussion with fathers about how to involve them in the study of these strategies is recommended. Finally, we propose that parents who seek primary or specialized care for their overweight teen may benefit from an intervention teaching skills in developing moderate-control parenting practices within the context of authoritative parenting style.

Though a pilot study with many limitations, we would urge clinicians to consider observing indicators of parenting style, parent modeling, family eating and exercise habits, and knowledge of nutrition. Hypotheses about these factors and high BMI in youth may be generated and tested.

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References

- Arredondo EM, Elder JP, Ayala GX, Campbell N, Baquero B, Duerksen S. Is parenting style related to children's healthy eating and physical activity in Latino families? *Health Education Research*. 2006; 21(6):862–871. [PubMed: 17032706]
- Barber BK. Parental psychological construct: Revisiting a neglected construct. *Child Development*. 1996; 67:3296–3319. [PubMed: 9071782]
- Barradas DT, Fulton JE, Blanck HM, Huhman M. Parental influences on youth television viewing. *The Journal of Pediatrics*. 2007; 151(4):369. [PubMed: 17889071]
- Baumrind D. Authoritarian vs. authoritative parental control. *Adolescence*. 1968; 3:255–272.
- Baumrind D. Current patterns of parental authority. *Developmental Psychology Monograph*. 1971; 4:1–103.
- Baumrind D. Patterns of parental authority and adolescent autonomy. *New directions for child development: Changes in parental authority during adolescence*. 2005:61–69.
- Berge JM, Wall M, Loth K, Neumark-Sztainer D. Parenting style as a predictor of adolescent weight and weight-related behaviors. *Journal of Adolescent Health*. 2010; 46:331–338. [PubMed: 20307821]
- Berry D, Sheehan R, Heschel R, Knafl K, Melkus G, Grey M. Family-based interventions for childhood obesity: A review. *Journal of Family Nursing*. 2004; 10(4):429–449.
- Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatric Clinics of North America*. 2001; 48(4):893–907. [PubMed: 11494642]
- Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: A measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite*. 2001; 36(3):201–210. [PubMed: 11358344]
- Boehmer TK, Lovegreen SL, Haire-Joshu D, Brownson RC. What constitutes an obesogenic environment in rural communities? *American Journal of Health Promotion*. 2006; 20(6):411. [PubMed: 16871821]
- Bronte-Tinkew J, Moore KA, Carrano J. The father-child relationship, parenting styles, and adolescent right behaviors in intact families. *Journal of Family Issues*. 2006; 26(6):31.
- Bunker K. Dads' parenting style may affect kids' weight (Type 2). *Diabetes Forecast*. 2008; 61(3):21–22.
- Caballero B. Obesity prevention in children: Opportunities and challenges. *International Journal of Obesity*. 2004; 28(Supplement 3):S90–S95. [PubMed: 15543227]
- Chen JL, Kennedy C. Family functioning, parenting style, and Chinese children's weight status. *Journal of Family Nursing*. 2004; 10(2):262.
- Chia-Chen Chen A, Thompson EA. Preventing adolescent risky sexual behavior: parents matter! *Journal for Specialists in Pediatric Nursing*. 2007; 12(2):119–122. [PubMed: 17371556]
- Cohen J. The statistical power of abnormal-social psychological research: A review. *Journal of Abnormal Social Psychology*. 1962; 65:145–153. [PubMed: 13880271]
- Costanzo P, Woody EZ. Domain specific parenting styles and their impact on the child's development of particular deviance: The example of obesity-proneness. *Journal of Social and Clinical Psychology*. 1984; 3:25–445.
- Darling N, Steinberg L. Parenting style as context: An integrative model. *Psychological Bulletin*. 1993; 113:487–496.
- Delva J, O'Malley PM, Johnston LD. Racial/ethnic and socioeconomic status differences in overweight and health-related behaviors among American students: National trends 1986-2003. *Journal of Adolescent Health*. 2006; 39(4):536. [PubMed: 16982389]

- Domenech Rodriguez MM, Donovan MR, Crowley SL. Parenting styles in a cultural context: observations of “protective parenting” in first-generation Latinos. *Family Process*. 2009; 48(2): 195–210. [PubMed: 19579905]
- Epstein LH, Paluch RA, Roemmich JHN, Beecher MD. Family based obesity treatment then and now: Twenty-five years of pediatric obesity treatment. *Health Psychology*. 2007; 26(4):381–391. [PubMed: 17605557]
- Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B. Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity Research*. 2004; 12(11):1711. [PubMed: 15601964]
- Forgatch, MS.; Patterson, GR. Parent management training-Oregon Model: An intervention for antisocial behavior in children and adolescents. In: Weisz, J.; Kazdin, AE., editors. *Evidence based psychotherapies for children and adolescents*. Second Edition. New York: Guilford Press; 2010. p. 157-178.
- Gibson EL, Wardle J, Watts CJ. Fruit and vegetable consumption, nutritional knowledge, and beliefs in mothers and children. *Appetite*. 1998; 31:205–228. [PubMed: 9792733]
- Golan M. Parents as agents for change in childhood obesity - from research to practice. *International Journal of Pediatric Obesity*. 2006; 1(2):66–76. [PubMed: 17907317]
- Golan M, Crow S. Targeting parents exclusively in the treatment of childhood obesity: Long-term results. *Obesity Research*. 2004; 12(2):357. [PubMed: 14981230]
- 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. *International Journal of Obesity and Related Metabolic Disorders*. 1998; 22(12):1217–1224. [PubMed: 9877257]
- Golan M, Weizman A. Familial Approach To The Treatment Of Childhood Obesity: Conceptual Model. *Journal of Nutrition Education and Behavior*. 2001; 33(2):102–107.
- Golan M, Weizman A. Reliability and validity of the Family Eating and Activity Habits Questionnaire. *European Journal of Clinical Nutrition*. 1998; 52(10):771. [PubMed: 9805227]
- Greening L, Stoppelbein L, Luebbe A. The moderating effects of parenting styles on African-American and Caucasian children’s suicidal behaviors. *Journal of Youth and Adolescence*. 2009; 38 Epub.
- Hughes SO, Power TG, Orlet Fisher J, Mueller S, Nicklas TA. Revisiting a neglected construct: Parenting styles in a child-feeding context. *Appetite*. 2005; 44(1):83–92. [PubMed: 15604035]
- Johnson WG, Hinkle LK, Carr RE, Anderson DA, Lemmon CR, Engler LB, et al. Dietary and exercise interventions for juvenile obesity: Long-term effect of behavioral and public models. *Obesity Research*. 1997; 5:257–261. [PubMed: 9192400]
- Kim K, Rohner RP. Parental warmth, control, and involvement in schooling: Predicting academic achievement among Korean American adolescents. *Journal of Cross-Cultural Psychology*. 2002; 33(2):127–140.
- Kirschenbaum DS, Harris ES, Tomarken AJ. Effects of parental involvement in behavioral weight loss therapy for preadolescents. *Behav Ther*. 1984; 15:485–500.
- Kitzman KM, Beech BM. Family-based interventions for pediatric obesity: Methodological and conceptual challenges from family psychology. *Journal of Family Psychology*. 2006; 20:175–189. [PubMed: 16756393]
- Lessard J, Greenberger E, Chen C. Adolescents’ response to parental efforts to influence eating habits: When parental warmth matters. *Journal of Youth and Adolescence*. 2010; 39:73–83. [PubMed: 20091218]
- Lewis CC. The effects of parental firm control: A reinterpretation of the findings. *Psychological Bulletin*. 1981; 90:547–563.
- Lopez RP, Hynes HP. Obesity, physical activity, and the urban environment: public health research needs. *Environmental Health*. 2006; 5:25. [PubMed: 16981988]
- Mellin LM, Slinkard LA, Irwin CE. Adolescent obesity intervention: Validation of the SHAPEDOWN program. *Journal of the American Dietetic Association*. 1987; 87(3):333–338. [PubMed: 3819254]
- Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US Children and Adolescents, 2007-2008. *Journal of the American Medical Association*. 2010; 303:242–249. [PubMed: 20071470]

- Patterson GR, Forgatch MS. Therapist behavior as a determinant for client noncompliance: A paradox of the behavior modifier. *Journal of Consulting & Clinical Psychology*. 1985; 53:846–851. [PubMed: 4086685]
- Pugliese J, Tinsley B. Parental socialization of child and adolescent physical activity: A meta-analysis. *Journal of Family Psychology*. 2007; 21(3):331. [PubMed: 17874918]
- Regber S, Berg-Kelly K, Marild S. Parenting styles and treatment of adolescents with obesity. *Pediatric Nursing*. 2007; 33(1):21–28. [PubMed: 17410997]
- Robinson TN, Kiernan M, Matheson DM, Haydel KF. Is parental control over children's eating associated with childhood obesity? Results from a population-based sample of third graders. *Obesity Research*. 2001; 9(5):306–312. [PubMed: 11346672]
- Saelens BE, Sallis BJ, Wilfley DE, Patrick K, Cella JA, Buchta R. Behavioral weight control for overweight adolescents initiated in primary care. *Obesity Research*. 2002; 10(1):22–32. [PubMed: 11786598]
- Smetana JG. Parenting styles and conceptions about parental authority during adolescence. *Child Development*. 1995; 66:299–316. [PubMed: 7750367]
- Spruijt-Metz D, Lindquist CH, Birch LL, Fisher JO, Goran MI. Relation between mothers' child-feeding practices and children's adiposity. *American Journal of Clinical Nutrition*. 2002; 75(3): 581–586. [PubMed: 11864866]
- Stein RI, Epstein LH, Raynor HA, Kilanowski CK, Paluch RA. The influence of parenting change on pediatric weight control. *Obesity Research*. 2005; 13(10):1749. [PubMed: 16286522]
- Steinberg L. We know some things: Parent-adolescent relationships in retrospect and prospect. *Journal of Research on Adolescence*. 2001; 11(1):1.
- Steinberg L, Blatt-Eisengart I, Cauffman E. Patterns of competence and adjustment among adolescents from authoritative, authoritarian, indulgent, and neglectful homes: A replication in a sample of serious juvenile offenders. *Journal of Research on Adolescence*. 2006; 16(1):47–58. [PubMed: 20016759]
- Tyler DO, Horner SD. Family centered collaborative negotiation: A model for facilitating behavior change in primary care. *Journal of the American Academy of Nurse Practitioners*. 2008; 20:194–2003. [PubMed: 18387016]
- van Strien T, Snoek HM, van der Zwaluw CS, Engels RC. Parental control and the dopamine D2 receptor gene (DRD2) interaction on emotional eating in adolescence. *Appetite*. 2010; 54(2):255–261. [PubMed: 19925838]
- Wardle J, Carnell S, Haworth C, Plomin R. Evidence for a strong genetic influence on childhood adiposity despite the force of the obesogenic environment. *American Journal of Clinical Nutrition*. 2008; 87:398–404. [PubMed: 18258631]
- White MA, Martin PD, Newton RL, Walden HM, York-Crowe EE, Gordon ST, et al. Mediators of weight loss in a family-based intervention presented over the Internet. *Obesity Research*. 2004; 12:1050–1059. [PubMed: 15292468]
- Whitlock, EP.; O'Connor, EA.; Williams, SB.; Beil, TL.; Lutz, KW. Effectiveness of primary care interventions for weight management in children and adolescents: An updated, targeted systematic review for the USPSTF. Rockville, MD: Agency for Healthcare Research and Quality; 2010.

Figure 1.
Conceptual Framework – family environment and youth overweight

Figure 2.
Forest plot of effect sizes and 95% Confidence Intervals for differences between mother's high and moderate control.

Table 1

Social and Family Characteristics.

Variable	Parent		Youth	
	N	%	N	%
Gender:				
Male	4	14.3	18	64.3
Female	24	85.7	10	35.7
Age:				
Min.	32		10	
Max.	64		18	
Mean	44.14		13.14	
Std. Dev.	7.37		2.40	
Ethnicity:				
Hispanic	2	7.1	2	7.1
Non-Hispanic	25	89.3	26	92.9
Missing	1	3.6		
Race: ^a				
Native American	1	3.6	7	25.0
Asian-American	2	7.1	2	7.1
Native Hawaiian	1	3.6	1	3.6
African-American	3	10.7	6	21.4
European American	21	75.0	22	78.6
Marital Status:				
Married	14	50		
Single	6	21.4		
Divorced	7	25		
Separated	1	3.6		
Employment:				
Full time	16	57.1		
Part time	5	17.9		
Not employed	8	25		
Income:				
\$9,999 or less	2	7.1		
\$10K to \$19,999	2	7.1		
\$20K to \$29,999	0	0		
\$30K to \$39,999	2	7.1		
\$40K to \$49,999	1	3.6		
\$50K or greater	19	67.9		

Variable	Parent		Youth	
	N	%	N	%
Missing	2	7.1		
Education (Grade Level):				
Min.	11		5	
Max.	20		12	
Missing	1		0	
Mean	15.22		7.54	
Std. Dev.	2.42		2.19	
Knowledge of Nutrition				
N	28			
Min	2.0			
Max	4.0			
Missing	0			
Mean	3.21			
Std. Dev	0.57			
Height (in inches): ^b				
N	28		28	
Min.	61.5		56.81	
Max.	73.0		73.5	
Mean	66.64		64.21	
Std. Dev.	3.49		4.79	
Weight (in pounds): ^b				
N	28		28	
Min.	120		114	
Max.	297		382	
Mean	196.97		192.52	
Std. Dev.	46.72		59.52	
BMI: ^b				
N	28		28	
Min.	17.93		22.56	
Max.	48.42		53.27	
Mean	30.75		32.33	
Std. Dev.	7.22		6.28	
DXA: ^b				
N			23	
Missing			5	
Total Lean Mass (kg)				

Variable	Parent		Youth	
	N	%	N	%
Min.			25.91	
Max.			65.49	
Mean			42.64	
Std. Dev.			11.44	
Total Fat Mass (kg)				
Min.			24.09	
Max.			65.86	
Mean			41.11	
Std. Dev.			10.50	
Percent Body Fat				
Min.			24.4	
Max.			49.2	
Mean			38.67	
Std. Dev.			5.82	

^aYouth can choose more than one race

^bSelf-reported for parent, chart review or projected scores for youth

Table 2

Summary of PARQ/Control Categories.

	Youth about Mother (N=28) Missing: 1	Youth about Father (N=22) Missing: 6	Parent (N=28) Missing: 0
Warmth/Affection			
Min.	59	43	65
Max.	80	80	80
Mean	71.69	68.44	76.12
SD	(6.45)	(11.97)	(3.75)
Alpha coefficient	0.84	0.96	0.74
Hostility/Aggression			
Min.	15	15	15
Max.	40	41	38
Mean	24.46	23.49	24.71
SD	(6.79)	(8.75)	(6.18)
Alpha coefficient	0.84	0.92	0.84
Indifference/Neglect			
Min.	15	15	15
Max.	33	43	29
Mean	22.98	25.06	19.89
SD	(5.19)	(8.65)	(3.62)
Alpha coefficient	0.73	0.90	0.54
Rejection			
Min.	10	10	10
Max.	27	29	19
Mean	16.97	16.32	14
SD	(4.70)	(5.54)	(2.76)
Alpha coefficient	0.76	0.85	0.49
Overall acceptance/rejection			
Min.	63	62	60
Max.	135	167	111
Mean	92.72	96.43	82.5
SD	(19.67)	(33.62)	(13.03)
Alpha coefficient	0.79	0.87	0.71
Control			
Min.	26	19.5	29
Max.	48	52	48
Mean	36.92	35.30	39.14
SD	(5.99)	(8.13)	(5.45)
Alpha coefficient	0.76	0.85	0.79

Table 3

Summary of PARQ/Control Acceptance (Responsiveness) and Control Scales.

	Youth about mother		Youth about father		Parent	
	N	%	N	%	N	%
Acceptance						
More rejection than acceptance	0		2	7.1	0	
Serious rejection (not more overall rejection than acceptance)	0		1	3.6	0	
Substantial parental love	23	82.1	17	60.7	28	
Missing	1	3.6	6	21.4		
Control						
Minimum (Low/Lax)	1	3.6	3	10.7	0	
Moderate	13	46.4	14	50.0	11	39.3
Firm	12	42.9	3	10.7	13	46.4
Strict Restrictive	1	3.6	2	7.1	4	14.3
Missing	1	3.6	6	21.4		

Table 4

Distribution of Scores on Instruments to Measure Parents' Modeling of Health Behavior (FEAHQ) and Child Feeding Practices (R-CFQ).

Instrument	N	Min	Max	Mean	SD	Alpha	Missing
Family Activity and Eating Habits Questionnaire	27	-2.70	87	32.51	18.36	0.78	1
Revised Child Feeding Practices Questionnaire (R-CFQ) Subscales *							
Responsibility for Feeding	28	2.33	5.00	3.64	0.71	0.52	0
Parent's Perceived Weight	28	2.25	4.25	3.33	0.49	0.55	0
Parent's Perception of Child's Weight	28	2.83	4.33	3.36	0.31	0.61	0
Concerns for Child's Weight	28	1.67	5.00	3.92	1.25	0.94	0
Food Restriction	28	2.38	5.00	3.75	0.57	0.60	0
Pressure to Eat	27	1.00	4.00	1.86	0.80	0.70	1
Monitoring Food Intake	27	1.00	5.00	3.59	1.13	0.97	1

* The potential minimum is -4.0 and the potential maximum depends on the sum of availability of less appropriate foods and eating patterns. Higher numerical values reflect less appropriate eating patterns and foods.

** All subscales have a potential minimum of 1.00 and potential maximum of 5.00.

Table 5

Differences in Effect Sizes for Mothers with Moderate and High Control by Parent Modeling, Child Feeding Practices, and Socio-Demographic Characteristics.

Variable	Moderate (n = 12)	High (n = 12)	<i>D</i>	95% CI
Mother's Modeling Behavior				
<i>M</i>	34.96	27.71		
<i>SD</i>	20.49	15.92	0.38	-0.43, 1.19
Perceived Feeding Responsibility				
<i>M</i>	3.78	3.72		
<i>SD</i>	0.70	0.65	0.09	-0.72, 0.88
Perception of Parent Weight				
<i>M</i>	3.17	3.54		
<i>SD</i>	0.56	0.44	-0.72	-1.55, 0.10
Perception of Youth Weight				
<i>M</i>	3.31	3.43		
<i>SD</i>	0.31	0.36	-0.32	-1.13, 0.48
Concern about Youth Weight *				
<i>M</i>	3.5	4.61		
<i>SD</i>	1.34	0.87	-0.95	-1.79, -0.10
Restrict Food				
<i>M</i>	3.75	3.85		
<i>SD</i>	0.56	0.53	-0.18	-0.99, 0.62
Pressure to Eat				
<i>M</i>	1.48	1.75		
<i>SD</i>	0.58	1.05	-0.31	-1.13, 0.51
Monitoring of Youth Diet				
<i>M</i>	3.83	3.72		
<i>SD</i>	0.92	1.25	-0.09	-0.70, 0.89
Mother Knowledge of Nutrition				
<i>M</i>	3.5	3.17		
<i>SD</i>	0.52	0.39	0.69	-0.13, 1.52
Mother Education				
<i>M</i>	15.18	15	0.08	-0.74, 0.89
<i>SD</i>	1.89	2.63		
Mother BMI **				
<i>M</i>	27.21	35.51	-1.23	-2.11, -0.36
<i>SD</i>	5.42	7.40		

Variable	Moderate (n = 12)	High (n = 12)	<i>D</i>	95% CI
Youth BMI^a				
<i>M</i>	30.79	33.17	-0.49	-1.30, 0.32
<i>SD</i>	4.95	4.47		
Youth percent body fat				
<i>M</i>	37.58	40.24		
<i>SD</i>	6.72	5.21	-0.43	-1.31, 0.44
Proportions				
Mother's Minority Status ^{**}	0%	46.1%	1.49	0.66, 2.09
Mother's Partner Status	54%	38.4%	-0.32	-0.64, 1.05
Mother's Poverty Status	9%	30%	-0.20	-1.02, 1.54

^a as reported by the Pediatric Medical Clinic

* Significant $p = 0.03$

** Significant $p = 0.016$ (exact)