Correlates of Change in a Childhood Obesity Treatment Program

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Abstract

- *Objective:* To conduct a preliminary examination of psychosocial determinants of health behavior change that underlie the success of a multidisciplinary, family-based childhood obesity treatment program.
- *Methods:* Participants were families enrolled in an obesity treatment program from July 2007 to December 2008. Nineteen families agreed to participate. Both the parent and the child individually completed questionnaires that assessed the child's quality of life (QOL) and psychosocial factors related to healthy behaviors at the start of treatment and again after 4 months of treatment. Body mass index (BMI) was calculated at each visit. Complete data were available from 7 families. Data were analyzed using Pearson correlations.
- *Results:* Children who attended more sessions had greater reductions in BMI and greater improvements in social support. Children whose BMI decreased more had greater improvements in physical health, psychosocial health, overall QOL, and social support. Improvements in QOL were associated with improvements in parental social support and self-efficacy.
- *Conclusion:* Given the severity of the comorbidities associated with childhood obesity, it is essential to further examine the mechanisms underlying the effectiveness of treatment programs that are aimed to decrease BMI and improve QOL in children.

Obesity is currently one of the most prevalent health issues affecting children in developed countries. The International Obesity Task Force [1] reported that there are more than 155 million children worldwide who are overweight or obese. Over the past 3 decades, the rate of adolescent obesity has tripled in Canada, from 3% in 1978 to 9% in 2004 [2]. In the United States, 16% of children and adolescents (aged 6–19 years) are obese [3]. Childhood obesity is a serious concern, as it is associated with medical conditions such as type 2 diabetes mellitus, high blood pressure, and heart disease as well as psychosocial problems [4]. These physical and mental health problems have a significant impact on an individual's quality of life (QOL) [5]. Compared with nonoverweight children, overweight and obese children have significantly lower levels of functioning, specifically in physical and social domains [5]. Thus, it is not surprising that overall increased weight is associated with a decrease in QOL [5]. Based on the detrimental effects of obesity, the development of effective obesity treatment programs aimed to decrease weight and improve QOL is essential.

Developed over 25 years ago, multidisciplinary, family-based behavioral obesity treatment programs have demonstrated efficacy both in the short and long term [6]. Children are generally referred to family-based treatment programs based on their health status (ie, high body mass index [BMI] or high cholesterol levels). Such treatment programs usually are multidisciplinary and include a psychologist, pediatrician, nutritionist or dietician, and physical trainer. Children and their parents enroll in the program together and learn behavior modification techniques to make healthy changes with respect to eating and physical activity habits. Behavior modification techniques involve self-regulation skills, including goal setting, self-monitoring, and corrective behaviors (eg, setting proper portion sizes, scheduling daily physical activity) [7].

The goal of childhood obesity treatment programs is to foster positive changes in clinical outcomes, including decreased BMI and improved QOL. There is some evidence to suggest that multidisciplinary, family-based treatment programs improve QOL and BMI [5,6,8]. However, little is known about how these programs work. A mediating variable framework is useful for providing insight into the mechanism underlying program success [9]. According to

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Table 1. Full Treatment Program

Pediatrician 3 Visits	Psychologist 7 Sessions	Nutritionist 5 Sessions	Trainer 5 Sessions
Review of blood work	Body mass index, balance, behavior modification	Portion sizes, food groups and servings	Assess level of activity, put an action plan into place
Medical monitoring	Hunger vs. want	Nutrition labels, ingredient lists, food marketing, meal/snack ideas, balance	Continue with action plan
Medical monitoring	Inhibitors & listening to your body	Fiber and fat, importance of hydration, calories from drinks, hunger signs	Change action plan as needed
	Goals & rewards	Speed of eating, food alternatives, mall food, enjoying food	Change action plan as needed
	Food traps/pushers	Review, questions, tips for success	Change action plan as needed
	Problem solving		
	Preventing slips and blips		

this framework, the success of an obesity treatment program results from program-induced changes in mediating variables, which in turn lead to changes in clinically meaningful outcomes [10]. Establishing a relationship between potential mediating variables (eg, self-efficacy, social support) and program outcomes is an important first step in applying this framework [9]. This study is a preliminary investigation of the relationship between psychosocial determinants of health behavior change (self-efficacy and social support) and clinical outcomes (BMI and QOL). This pilot investigation was conducted in the context of the healthy lifestyle treatment program offered at a pediatric obesity clinic in Calgary, Alberta, Canada. We hypothesized that increased attendance would lead to a greater change in outcomes. Furthermore, it was hypothesized that improvements in BMI and QOL would correlate with changes in the psychosocial factors.

Methods

Setting

The Pediatric Obesity Clinic (POC) is a fee-for-service multidisciplinary, family-based behavioral childhood obesity treatment program in Calgary, Alberta, Canada. The POC treatment program provides support to families through sessions with a multidisciplinary health care team (ie, psychologist, pediatrician, nutritionist, and physical trainer). Participants in this program characteristically represent lower-income and underserved families living in Calgary. Families are assessed initially by the psychologist and pediatrician and then are enrolled in either the full program (20 visits/sessions, **Table 1**) or modified treatment program (4 sessions). However, for the purposes of this study, only families enrolled in the full treatment program were included in this study. The typical program includes biweekly appointments with several of the health care providers.

Participants and Procedure

Families who attended the POC from July to December 2007 were asked to participate in this study. Nineteen families agreed to participate (11 girls and 8 boys [age range, 6–17 years], 13 moms, and 6 dads). Participants signed consent forms and completed a baseline questionnaire (Time 1). After 4 months of treatment, 7 families (2 boys and 5 girls [age range, 8–17 years; mean age, 10.67 years], 5 moms, and 2 dads) completed the follow-up questionnaire (Time 2). Questionnaires were administered in the waiting room or were completed at home and returned to the clinic. Parents were asked to read the questionnaire to children who were not yet able to read. Participation was voluntary, and participants were not compensated for taking part in the study. All participants were thanked and given a debriefing letter after completing the second questionnaire. Because participants who dropped out of the study did not necessarily drop out of the treatment program, we were able to assess 4-month BMI for all participants.

Primary Outcome Measures

The primary outcome measures were BMI and QOL. BMI was calculated using weight (kg)/height $(m)^2$ based on measurements taken at the beginning of each appointment. The Pediatric Quality of Life Inventory (PedsQL) [11] was used to assess children's QOL. The 23-item self-report questionnaire includes 4 subscales that assess physical (8 items), emotional (5 items), social (5 items), and school functioning (5 items). The instrument yields a total summary score (overall QOL), a physical health summary score (8 items), and a psychosocial health summary score (15 items). It includes items such as "In the past month, how much of a problem has it been for you (or for your child) to walk more than 1 block?" Age-specific versions of the questionnaire were administered as follows: child (aged 8–12 years), teenager (aged 13–18 years),

and parent. Each item was rated on a 5-point scale from 0 (never) to 4 (almost always). Higher scores indicated higher functioning. Varni et al [12] reported that across a large sample size, both the child and parent versions of the PedsQL exceeded the minimum internal reliability criterion of 0.70 and had satisfactory validity because the questionnaire was able to distinguish between children with chronic conditions and healthy children. In our study, the Cronbach's α for each subscale was acceptable (αs = 0.73–0.93). Child and parent scores in this study were moderately correlated (*r*s = 0.79–0.85).

Secondary Outcome Measures

Secondary outcome measures included attendance, social support (ie, the role of family and/or friends in providing support to encourage an individual to make behavioral changes), and self-efficacy (ie, an individual's confidence in his/her ability to organize and perform actions in order to achieve a specific outcome [13]). Attendance was calculated by dividing the number of sessions the child and parent attended by half the number of weeks (biweekly appointments) between Time 1 and Time 2.

Child and parent social support was assessed using a 4-item scale modified from Sallis et al [14]. This scale examined the degree to which children felt their parents supported their participation in healthy behaviors as well as the degree to which parents felt they supported their child's participation in healthy behaviors. This scale included items such as "During a typical week, how often did you or a member of your household encourage your child (or did a parent or family member encourage you) to do physical activities or play sports?" Each item was rated on a 5-point scale from 0 (never) to 4 (every day). Higher scores indicated a higher level of social support. Scores were separated into social support for either physical activity or healthy eating. Total social support scores for each health behavior (physical activity and healthy eating) are sums of the scores on each item. Other studies [15] have used this scale and found internal consistency of 0.78 and 1-week test-retest reliability of $r = 0.78$. Cronbach's α was acceptable for child and parent social support for physical activity (αs = 0.70–0.84) and parent social support for healthy eating (αs = 0.71–0.84) but was not acceptable for child social support for healthy eating (αs < 0.70). Thus, data for child social support for healthy eating are not included in the analyses. Child and parent scores for social support for physical activity were moderately correlated ($r = 0.65$; $P < 0.05$).

Child and parent self-efficacy was assessed using an 11-item scale (for children) and a 6-item scale (for parents) modified from Sallis et al [16]. This scale assessed children's self-efficacy to engage in healthy behaviors and parents' self-efficacy to encourage their children to engage in healthy behaviors even "in the face of barriers." The child's self-efficacy scale included items such as, "How sure are you that you can do physical activity even when you are tired?", and the version of the scale for parents included items such as "How much can you do to help your children keep physically fit?" For the child's self-efficacy scale, each item was rated on a 5-point scale from 1 (I know I cannot) to 5 (I know I can), while the parent self-efficacy rated items on a 9-point scale from 1 (nothing) to 9 (a great deal). Higher scores indicated a higher level of self-efficacy. Total self-efficacy scores for each health behavior are the sums of the scores of each item. Other studies [15] using this scale have found internal consistency of 0.85 and adequate 1-week test-retest reliability. In our study, Cronbach's α was acceptable for parent self-efficacy (αs = 0.76–0.92); however, Cronbach's α was not acceptable for child self-efficacy, and thus child self-efficacy scores were not analyzed.

Analysis

Residual change scores were computed for all variables, and Pearson bivariate correlation analyses were conducted to assess the relationships between attendance, BMI, QOL, and change in each psychosocial variable. Pearson *r* correlation coefficient effect sizes were categorized as small (0.10), medium (0.30), and large (0.50) [17].

Results

Clinical outcome data and correlation coefficients for the relationships between clinical and psychosocial outcomes are included in **Table 2** and **Table 3**. Only data from the 7 families who completed questionnaires at both Time 1 and Time 2 are included in the analysis. Baseline characteristics (age, gender, BMI) were similar between participants who were lost to attrition and those who completed the 4-month questionnaire. The magnitude of change in BMI did not differ between participants lost to attrition and those who completed the 4-month questionnaire.

Increased attendance was associated with greater reductions in BMI ($r = –0.70$; $P < 0.05$) and greater improvements in both child- and parent-reported social support for physical activity ($r_s > 0.71$; $\rho_s < 0.05$). Although the correlations did not reach statistical significance, there was a trend such that as attendance increased, the magnitude of change increased for both child-reported physical health and parent-reported psychosocial health ($r_s > 0.55$; $\rho_s < 0.10$). No significant associations were found between attendance and change in parent self-efficacy.

Greater reductions in BMI were associated with greater

Table 2. Correlation Between Attendance, Child Outcome Variables, and Parent Psychosocial Variables Residual Change Scores

		Mean (SD)		Outcome Variables							
	Variable	Time 1	Time 2	1	2	3	4	5	6	7	8
1	Attendance, %	n/a	62.71%								
2	Body mass index	33.42 (8.88)	33.71 (8.60)	–0.70*							
3	Physical health, child report	58.67 (20.08)	70.40 (21.40)	0.55†	–0.53						
4	Psychosocial health, child report	68.33 (22.46)	65.24 (22.45)	0.33	–0.83‡	0.94‡					
5	Quality of life, child report	65.26 (20.90)	66.88 (20.70)	0.45	–0.79*	—	—				
6	Social support PA, child report	4.67 (2.16)	4.57 (1.90)	0.87*	–0.78*	0.53	0.51	0.50			
7	Social support PA, parent report	4.71 (1.89)	5.14 (1.35)	0.71*	–0.35	0.44	0.40	0.67*	0.35		
8	Self-efficacy PA, parent report	18.29 (5.86)	21.57 (4.47)	0.27	–0.31	0.70*	–0.03	0.17	0.15	0.30	
9	Self-efficacy HE, parent report	19.29 (4.42)	21.57 (3.74)	–0.02	–0.25	0.62	0.45	0.68*	–0.12	0.42	0.56†

Note: There were no significant differences between Time 1 and Time 2; however, most of the outcomes reported by children and all of the outcomes reported by parents improved over time and demonstrated small- to medium-sized effects. HE = healthy eating; PA = physical activity; SD = standard deviation.

*$P < 0.05$.

†$P < 0.10$.

‡$P < 0.01$.

improvements in child-reported physical health, QOL, and social support for physical activity ($r_s < –0.78$; $\rho_s < 0.05$). In addition, greater reductions in BMI were associated with greater improvements in parent-reported psychosocial health, QOL, and social support for physical activity ($r_s < –0.76$; $\rho_s < 0.05$). No significant associations were found between change in BMI and change in parent self-efficacy.

Greater improvements in child-reported physical health were associated with greater improvements in parent self-efficacy for physical activity ($r = 0.70$; $P < 0.05$). Furthermore, a greater improvement in child-reported QOL was associated with greater improvements in parent-reported social support for physical activity and parent self-efficacy for healthy eating ($r_s < 0.68$; $\rho_s < 0.05$). A greater improvement in parent-reported QOL was associated with greater improvements in parent self-efficacy for physical activity.

Discussion

Our study examined psychosocial determinants of health behavior change that potentially underlie the success of a childhood obesity treatment program. We examined the relationship between program attendance, changes in BMI, and changes in psychosocial outcome variables. In general, the more often patients attended the program, the more their BMI decreased and social support increased. Greater reductions in BMI were associated with greater improvements in QOL and social support. Finally, improvements in QOL were associated with improvements in parental social support and self-efficacy. These findings highlight important program outcomes and provide very preliminary insight into how the program may be affecting these outcomes.

One reason family-based programs are thought to be effective is because they involve the whole family, which enhances a family's ability to support each other in making health behavior changes [18]. According to social cognitive theory [19], social support plays an important role in making and maintaining behavioral changes. Finnegan and Suler [20] found that adults were more successful in maintaining weight loss when they perceived greater amounts of social support from others. Thus, it is logical to suggest that social support may be an important component of an effective clinical childhood obesity treatment program. The family-based model for treating childhood obesity includes a built-in component of social support by involving the family in the treatment process.

Research applying social cognitive theory has identified self-efficacy as another construct that influences health behavior change. Several studies support the role of high self-efficacy in making health behavior changes [15,18,21]. Linde and colleagues [21] found that among adults, self-efficacy beliefs were strongly associated with weight loss behaviors

Table 3. Correlation Between Attendance, Body Mass Index, and Parent Outcome Variables Residual Change Scores

		Mean (SD)		Outcome Variables						
	Variable	Time 1	Time 2	1	2	3	4	5	6	7
1	Attendance, %	n/a	62.71							
2	Body mass index	33.42 (8.88)	33.71 (8.60)	–0.70*						
3	Physical health, parent report	60.27 (23.01)	68.75 (14.99)	0.25	–0.50					
4	Psychosocial health, parent report	60.48 (20.36)	67.62 (19.22)	0.65†	–0.80*	0.84‡				
5	Quality of life, parent report	60.40 (19.58)	68.01 (16.97)	0.49	–0.84*	—	—			
6	Social support PA, parent report	4.71 (1.89)	5.14 (1.35)	0.71*	–0.76*	0.07	0.48	0.36		
7	Self-efficacy PA, parent report	18.29 (5.86)	21.57 (4.47)	0.27	–0.46	0.47	0.64†	0.62†	0.30	
8	Self-efficacy HE, parent report	19.29 (4.42)	21.57 (3.74)	–0.02	–0.48	0.42	0.35	0.46	0.42	0.56*

Note: There were no significant differences between Time 1 and Time 2; however, most of the outcomes reported by children and all of the outcomes reported by parents improved over time and demonstrated small- to medium-sized effects. HE = healthy eating; PA = physical activity; SD = standard deviation.

*$P < 0.05$.

†$P < 0.10$.

‡$P < 0.01$.

and weight change during treatment. There are several methods used to develop self-efficacy, including modeling (ie, watch an expert demonstrate the skill), mastery (ie, allow the individual to perform tasks and master them as they progressively become harder), and verbal persuasion (ie, verbal encouragement, "You can do it!"). Children are more likely to make behavior changes when their parents model healthy behaviors [22]. Accordingly, increasing self-efficacy may be an element of effective clinical childhood obesity treatment programs. Although previous research has established that self-efficacy [15,18,21] and social support [19,20] improve during an obesity treatment program, we did not examine changes in these variables over the treatment program given this study's small sample size.

Increased program attendance was associated with greater improvements in clinical outcomes such as BMI and QOL and psychosocial factors such as social support; however, the correlational nature of these findings precludes us from inferring causation. Prior research has demonstrated that participation in a treatment program can positively affect BMI, QOL, and psychosocial factors [5,6,8]. Future research should examine whether increased attendance leads to improved BMI as a result of program components that boost psychosocial factors (eg, having the trainer teach children to engage in physical activities that are appropriate for their skill and fitness level to ensure a mastery experience). Furthermore, future research might examine how program attendance specifically enhances parental social support. Because several studies have found that parents play a critical role in children making and maintaining health behavior changes [15,22–24], it is essential to further our understanding for methods of enhancing parent social support.

Greater reductions in BMI were associated with improvements in physical and psychosocial functioning, overall QOL, and social support. Prior research has demonstrated that overweight and obese children have significantly lower levels of physical and social functioning [5]; thus, it is not surprising that improvements in BMI were specifically associated with better physical and psychosocial functioning. Future research should aim to determine how social support might lead to improvements in BMI. For example, certain types of social support may be more beneficial than others to help children improve their BMI (ie, instrumental, tangible, informational, and/or emotional social support) [25].

Greater improvements in the child's QOL were associated with greater improvements in parent-reported social support and self-efficacy; however, the correlational nature of these findings precludes us from inferring causation. Future research should examine if a childhood obesity treatment program helps parents to effectively provide their child with social support; this in turn could help the child make healthy lifestyle changes and subsequently lead to improvements in QOL. Furthermore, the role of the child and the parent's self-efficacy in making healthy lifestyle changes should be examined within the specific context of a childhood obesity treatment program.

Limitations

Because this was a preliminary investigation, there were several limitations. One limitation was that the questionnaires were given to the family to complete. Although parents may have influenced their child's responses, the correlation between the parents' and children's measures were mostly moderate, suggesting that the children were not influenced entirely by their parent. Second, the sample size was small, thus limiting the generalizability of the results. Third, we did not have a control group with which to compare the treatment group at the clinic. This lack of control group does not allow us to comment on clinical outcomes and psychosocial changes that would have occurred without treatment or in an attention control condition. Finally, although these correlations were preliminary, it is best for the mediator to be assessed before the clinical outcome [26], which was not done in this study.

Conclusion

This study was undertaken to assess the psychosocial determinants of health behavior changes that potentially could underlie the success of a childhood obesity program. While we cannot make any causal claims, these findings suggest that self-efficacy and social support should be investigated as potential factors underlying the impact of program attendance on clinical outcomes. Higher attendance was associated with greater decreases in BMI and greater improvements in physical and psychosocial functioning and social support for physical activity. Given the severity of the comorbidities associated with childhood obesity, it is essential to further examine how treatment programs decrease BMI and improve QOL in children.

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References

1. International Obesity Task Force. Childhood obesity. Available at www.iotf.org/childhoodobesity.asp. Accessed 20 Apr 2009.
2. Merrifield R. Healthy weights for health kids: report of the Standing Committee on Health. Ottawa (ON): Communication Canada Publishing; 2007. Available at www.ccfn.ca/pdfs/HealthyWeightsForHealthyKids.pdf. Accessed 15 Apr 2009.
3. National Center for Health Statistics. Health, United States, 2008. Atlanta: U.S. Department of Health and Human Services; 2008. Available at www.cdc.gov/nchs/hus.htm. Accessed 4 May 2009.
4. Deckelbaum RJ, Williams CL. Childhood obesity: the health issue. Obes Res 2001;9 Suppl 4:239S–43S.
5. Williams J, Wake M, Hesketh K, et al. Health-related quality of life of overweight and obese children. JAMA 2005;293:70–6.
6. Epstein LH, Paluch RA, Roemmich JN, Beecher MD. Family-based obesity treatment, then and now: twenty-five years of pediatric obesity treatment. Health Psychol 2007;26:381–91.
7. Baumeister R, Heatherton T, Tice D. Losing control: how and why people fail at self-regulation. San Diego: Academic Press; 1994:3–12.
8. Wilfley DE, Tibbs TL, Van Buren DJ, et al. Lifestyle interventions in the treatment of childhood overweight: a meta-analytic review of randomized controlled trials. Health Psychol 2007; 26:521–32.
9. Baranowski T, Cerin E, Baranowski JC. Steps in the design, development and formative evaluation of obesity prevention-related behavior change trials. Int J Behav Nutr Phys Act 2009; 6:6.
10. Baranowski T, Lin LS, Wetter DW, et al. Theory as mediating variables: why aren't community interventions working as desired? Ann Epidemiol 1997;7 Suppl:89S–95S.
11. Varni JW, Seid M, Kurtin PS. PedsQL 4.0: reliability and validity of the pediatric quality of life inventory version 4.0 generic core scales in healthy and patient populations. Med Care 2001;39:800–12.
12. Varni JW, Burwinkle TM, Seid M, Skarr D. The PedsQL 4.0 as a pediatric population health measure: feasibility, reliability, and validity. Ambul Pediatr 2003;3:329–41.
13. Bandura A. Social foundations of thought and action. New York: Prentice Hall; 1986.
14. Sallis JF, Taylor WC, Dowda M, et al. Correlates of vigorous physical activity for children in grades 1 through 12: comparing parent-reported and objectively measured physical activity. Pediatr Exerc Sci 2002;14:30–44.
15. Trost SG, Sallis JF, Pate RR, et al. Evaluating a model of parental influence on youth physical activity. Am J Prev Med 2003; 25:277–82.
16. Sallis JF, Grossman RM, Pinski RB, et al. The development of scales to measure social support for diet and exercise behaviors. Prev Med 1987;16:825–36.
17. Munro BH. Statistical methods for health care research. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2005:93.
18. Anderson ES, Winett RA, Wojcik JR. Self-regulation, self-efficacy, outcome expectations, and social support: social cognitive theory and nutrition behavior. Ann Behav Med 2007; 34:304–12.
19. Bandura A. Social foundations of thought and action: a social

cognitive theory. Englewood Cliffs (NJ): Prentice-Hall; 1986.
20. Finnegan DL, Suler JR. Psychological factors associated with maintenance of improved health behaviors in postcoronary patients. J Psychol 1985;119:87–94.
21. Linde JA, Rothman AJ, Baldwin AS, Jeffery RW. The impact of self-efficacy on behavior change and weight change among overweight participants in a weight loss trial. Health Psychol 2006;25:282–91.
22. Wrotniak BH, Epstein LH, Paluch RA, Roemmich JN. The relationship between parent and child self-reported adherence and weight loss. Obes Res 2005;13:1089–96.
23. Golan M, Kaufman V, Shahar DR. Childhood obesity treatment: targeting parents exclusively v. parents and children. Br J Nutr 2006;95:1008–15.
24. Wrotniak BH, Epstein LH, Rocco AP, Roemmich JN. Parent weight change as predictor of child weight change in family-based behavioral obesity treatment. Arch Pediatr Adolesc Med 2004;158:342–7.
25. Clifford PA, Tan S, Gorsuch RL. Efficacy of a self-directed behavioral health change program: weight, body composition, cardiovascular fitness, blood pressure, health risk, and psychosocial mediating variables. J Behav Med 1991;14:303–23.
26. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. J Pers Soc Psychol 1986;51:1173–82.