

Running head: CHILDHOOD OBESITY, TREATMENT AND QUALITY OF LIFE

Effectiveness of a Childhood Obesity Treatment Program Based on Quality of Life

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## Abstract

Childhood obesity is a serious health concern associated with decreased quality of life. The purpose of this study was twofold. In the first part we assessed psychosocial factors associated with a high BMI among children. Second, we examined the changes in quality of life, social support, self-efficacy and enjoyment of health behaviours after three months of treatment in a multi-disciplinary family-based behavioural obesity treatment program. Twelve families enrolled in an obesity treatment program completed questionnaires that assessed the child's quality of life and psychosocial factors related to healthy behaviours. Both the parent (4 males, 8 females) and the child (3 boys, 9 girls, ranging in age from 6 to 17) individually completed the questionnaires near the start of treatment and again after three months of treatment. Pearson correlations and repeated measures ANOVAs were used to analyze the data. The findings suggest that multi-disciplinary family-based behavioural obesity treatment programs increase patients' physical functioning, social support, self-efficacy and enjoyment of health behaviours. These changes are important because the psychosocial factors listed are associated with increased success in achieving health behaviour changes.

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## Effectiveness of a Childhood Obesity Treatment Program Based on Quality of Life

Childhood obesity is one of the most prevalent health issues affecting children in developed countries today. The International Obesity Task Force (2002) reported that there are more than 155 million children worldwide who are overweight or obese. Over the past three decades the rate of adolescent obesity has tripled in Canada, from 3% in 1978 to 9% in 2004 (Standing Committee on Health, 2007). Given the alarming increase in the prevalence of childhood obesity, health promoters and practitioners must address this critical issue.

Childhood obesity is a serious concern because of the associated medical conditions such as Type II diabetes, high blood pressure, heart disease and psychosocial problems (Deckelbaum & Williams, 2001). Such medical and psychological disorders have a significant impact on an individual's general well-being, which is also known as quality of life (QOL). QOL can be determined by factors including academic, social, emotional and physical functioning. It is important for children to maintain a high QOL because QOL affects children's physical and emotional development, self-esteem and performance in school (Williams, Wake, Hesketh, Maher and Waters, 2005). Unfortunately, compared to non-overweight children, overweight and obese children have significantly decreased levels of functioning, specifically in physical and social domains (Williams et al., 2005). Thus it follows that overall increased weight is associated with a decrease in QOL (Williams et al., 2005). Based on the detrimental effects of obesity, the development of effective obesity treatment programs aimed to decrease weight and improve QOL is essential.

One type of childhood obesity treatment program is a multi-disciplinary family-based behavioural obesity treatment program. This type of program was developed over 25 years ago and its efficacy has been supported by both short- and long-term results (Epstein, Paluch,

Roemmich & Beecher, 2007). Children are generally referred to family-based treatment programs based on their health status (i.e., high BMI or high cholesterol levels). Such treatment programs are often multi-disciplinary because they include a psychologist, pediatrician, nutritionist or dietician, and physical trainer. Furthermore, child(ren) and their parent(s) enroll in the program together and participate in therapy to learn behaviour modification techniques to make healthy changes with respect to their eating and physical activity habits. Behaviour modification techniques involve self-regulation skills including goal setting, self-monitoring and corrective behaviours (Baumeister, Heatherton, & Tice, 1994). For example, health care providers teach children and their parents how to set proper portion sizes and schedule physical activity into their daily lives. One of the main reasons 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 behaviour changes (Anderson, Winett & Wojeik, 2007).

Social support involves an individual's family and/or friends and their roles in providing support to encourage the individual to make behavioural changes. Many prominent psychosocial theories (e.g., The Theory of Planned Behaviour, Ajzen, 1985) suggest that social support plays an important role in making and maintaining behavioural changes. Finnegan and Suler (2001) 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 one component of an effective childhood obesity treatment program would be to enhance social support. The family-based model for the treatment of childhood obesity provides a treatment approach with a component of social support built in by involving the family in the treatment process.

Self-efficacy is another construct that is essential for health behaviour change and is found in some form in virtually all health behaviour change models. Self-efficacy is an

individual's confidence in his or her ability to organize and perform actions in order to achieve a specific outcome (Bandura, 1986). There are several different methods used to develop self-efficacy including modeling, mastery and verbal persuasion. As previously discussed, children are more likely to make behaviour changes when their parents model healthy behaviours (Wrotniak et al., 2005). Furthermore, numerous studies support the role of high self-efficacy in making health behaviour changes (Anderson et al., 2007; Linde, Rothman, Baldwin & Jeffery, 2006; Trost, Sallis, Pate, Freedson, Taylor & Dowda, 2003). Linde et al. (2006) found that among adults, self-efficacy beliefs were strongly associated with weight loss behaviours and weight change during treatment. Based on this evidence, effective childhood obesity treatment programs should include an aspect that aims to increase patient's self-efficacy to make health behaviour changes.

An individual's attitude towards healthy behaviours can also play an important role in making health behaviour changes. The Theory of Planned Behaviour (Ajzen, 1985) suggests that while intentions are the most important predictor and determinant of behaviour, there are several factors that influence intentions, one of which is attitudes. Attitudes are the degree to which an individual has a positive or negative evaluation of a behavioural goal (Schifter & Ajzen, 1985). Thus, it is logical to suggest that an individual who has a positive evaluation of a health behaviour is more likely to engage in that behaviour, compared to a behaviour they have a negative attitude towards. For example, Aarts, Paulussen and Schaalma (1997) suggest that to help an individual schedule physical activity into their daily lives (i.e., become a habit), they should be encouraged to participate in activities that they enjoy and ones that are feasible for them. By engaging in activities the individual enjoys, they have positive experiences with the health behaviour, which may result in the individual feeling better. This positive feeling may

positively reinforce the behaviour which increases the likelihood of re-engaging in that behaviour. Furthermore, Ogden, Karim, Choudry and Brown (2007) found that positive attitudes towards food increased the participant's likelihood of eating it. Therefore, effective obesity treatment programs should target improving the child's attitude towards health behaviours.

There is some evidence to suggest that multi-disciplinary family-based treatment programs improve QOL (Epstein et al., 2007; Wilfley, Tibbs, Van Buren, Reach, Walker & Epstein, 2007). Family-based treatment programs may achieve this result through increasing the child's social support, self-efficacy and enjoyment of physical activity and healthy eating. Such programs provide an ideal environment because they involve the whole family, which encourages families to support each other in making health behaviour changes. Furthermore, because family-based treatment programs involve the whole family, the members can act as positive role models for each other to develop each other's self-efficacy. These treatment programs improve self-efficacy by setting progressive goals – as individuals meet their goals they develop enhanced self-efficacy to make more behaviour changes (Locke & Latham, 2006). In addition, by helping families arrange physical activity and healthy eating in ways that work for them, the program may enhance the enjoyment of such behaviours, possibly increasing the likelihood that they will maintain their behaviour changes over a long period of time.

The purpose of this study was twofold. The first objective was to examine the QOL implications of high BMI among children and the relationship between psychosocial factors (social support, self-efficacy and enjoyment) and BMI. We assessed quality of life by examining physical, social, emotional and academic functioning. Social support was defined as the amount parents felt they encouraged or participated in healthy behaviours with their child, and the amount children felt support from their parents to engage in healthy behaviours. Self-efficacy

was the degree to which children felt they could engage in healthy behaviours even when in a difficult situation (i.e., they are tired), and the degree parents felt they could get their children to engage in healthy behaviours. Enjoyment is the degree to which children like to eat healthy foods or engage in physical activity. We hypothesized that a higher BMI would be associated with a lower QOL, social support, self-efficacy and enjoyment of physical activity and healthy eating.

The second objective was to examine the effectiveness of the healthy lifestyle treatment program offered at the Pediatric Obesity Clinic (POC) in Calgary, Alberta. Effectiveness was evaluated based on child and parent self-reported improvements in QOL. We looked at four different factors: physical functioning, social support, self-efficacy and enjoyment of physical activity and healthy eating near the beginning of treatment and again after three months of treatment. We hypothesized that after three months of treatment these four factors would increase.

## Method

### *Participants and Procedure*

Twelve children (3 boys and 9 girls, ranging in age from 6 to 17) and twelve parents (4 males and 8 females) took part in this study. Participants were recruited from the Pediatric Obesity Clinic (POC) in Calgary, Alberta. Participants signed consent forms and then completed the questionnaire so that initial measures (near the start of treatment) could be assessed (Time 1). Participants completed the same questionnaire after three more months of treatment at the POC (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 questionnaires three months after treatment began.

### *Measures*

*Pediatric Quality of Life Inventory* (Peds-QL) (Varni & Seid, 1999) was used to assess the children's quality of life. This 23-item self-report questionnaire included four subscales to assess the child's physical, social, emotional and academic functioning and included items such as "In the past one month, how much of a problem has it been for you to walk more than one block?", and "In the past one month, how much of a problem has it been for you to get along with other children?". Age-specific versions of the questionnaire were administered as follows: young child (ages 5-7), child (ages 8-12) and teenager (13-18). For the young child version each item was rated on a 3-point scale associated with 3 faces from 0 (*Not at all/Smiley face*) to 2 (*Sometimes/Not happy or sad face*) to 4 (*A lot/frowning face*). For the child and teenager version, each item was rated on a 5-point scale from 0 (*Never*) to 4 (*Almost Always*). Scores were linearly transformed to a 0-100 scale as follows: 0=100, 1=75, 2=50, 3=25 and 4=0, such that higher scores on this scale indicated higher functioning. Physical functioning was the average of the child's responses on the physical functioning scale and psychosocial functioning was the average of the child's responses on the emotional, social and academic functioning scales. Quality of life was the child's average score across all four subscales. Physical, psychosocial and overall functioning scores are averages of the items' scores (Table 1). Varni, Burwinkle, Seid and Skarr (2003) reported that across a large sample size, both the child and parent versions exceeded the minimum internal reliability criterion of 0.70, and had satisfactory validity because the Peds-QL was able to distinguish between children with chronic conditions and healthy children. See Table 2 for Cronbach's alpha scores of internal consistency.

Parent social support was assessed using a four-item scale modified from Sallis, Taylor, Dowda, Freedson and Pate (2002) which examined the degree to which parents and family members support children in being physically active and eating healthy. This scale included items such as “During a typical week, how often did you or a member of your household encourage your child to do physical activities or play sports?”, and “During a typical week, how often did you or a member of your household eat healthy meals with your child?”. Each item is rated on a 5-point scale from 0 (*Never*) to 4 (*Every day*). Scores were separated into social support for either physical activity or healthy eating. Higher scores on this scale indicated a higher level of social support. Total social support scores for each health behaviour are sums of the items’ scores (Table 1). Other studies (Troost et al., 2003) have used this scale and found internal consistency of .78, and 1-week test-retest reliability  $R=.78$ . See Table 2 for Cronbach’s alpha scores of internal consistency.

Child social support was assessed using a four-item scale modified from Sallis, et al., (2002), which assessed children’s perception of the social support they receive from family members to engage in physical activity and healthy eating. Scale items included items such as “During a typical week, how often has a member of your household done a physical activity or played sports with you?”, and “During a typical week, how often has a member of your household encouraged you to be a healthy eater?”. Each item is rated on a 5-point scale from 0 (*None*) to 4 (*Every day*). Scores were divided into social support for healthy eating and social support for physical activity. Total social support for each health behaviour is the sum of the items’ scores (Table 1). Other studies (Troost et al., 2003) have used this scale and found internal consistency of .78, and 1-week test-retest reliability  $R=.78$ . See Table 2 for Cronbach’s alpha scores of internal consistency.

Parent self-efficacy was assessed using a six-item scale modified from Sallis, Pinski, Grossman, Patterson and Nader (1988) which assessed parents' self-efficacy to encourage their children to be physically active and to eat healthy. This six-item scale included items such as "How much can you do to help your children keep physically fit?", and "How much can you involve yourself with your children in their eating habits?". Each item is rated on a 9-point scale from 1 (*Nothing*) to 9 (*A Great Deal*). Higher scores on this scale indicated a higher level of self-efficacy. Total self-efficacy scores for each health behaviour are sums of the items' scores for either physical activity or healthy eating (Table 1). Other studies (Troost et al., 2003) have used this scale and found internal consistency of .85, and 1-week test-retest reliability  $R=.89$ . See Table 2 for Cronbach's alpha scores of internal consistency.

Child self-efficacy was assessed using an 11-item scale modified from Sallis et al., (1988) which assessed children's self-efficacy to engage in physical activity and eat healthfully. Scale items included "How sure are you that you can do physical activity even when you are tired?", and "How sure are you that you can stick to eating healthy even when you feel sad, bored or tense?". Each item is rated on a 5-point scale from 1 (*I know I cannot*) to 5 (*I know I can*). Higher scores on this scale indicated a higher level of self-efficacy. Total self-efficacy scores for each health behaviour are sums of the items' scores for physical activity or healthy eating (Table 1). Other studies (Troost et al., 2003) have used this scale and found internal consistency of .85, and 1-week test-retest reliability  $R=.89$ . See Table 2 for Cronbach's alpha scores of internal consistency.

Child enjoyment of health behaviours was assessed using a two-item scale modified from Sallis et al., (2002) which assessed how much the child liked to either engage in physical activity or healthy eating. This two-item scale asked children "How much do you like eating healthy

foods?” and “How much do you like engaging in physical activity?”. Higher scores on this scale indicated that the child enjoys the activity more. Total enjoyment was the participant’s response for either physical activity or healthy eating (Table 1). Other studies (Troost et al., 2003) have used this scale and found 1-week test-retest reliability of  $R=0.76$ .

### *Treatment Program*

The Pediatric Obesity Clinic (POC) is a multi-disciplinary family-based behavioural childhood obesity treatment program that was modeled after the successful ‘Weigh of Life’ program offered at the Texas Children’s Hospital. The POC treatment program involves a multi-disciplinary health-care team providing support to families through sessions with a psychologist, pediatrician, nutritionist and physical trainer. Families are assessed initially by the psychologist and pediatrician and then enroll in either the full program (17 sessions plus 4 follow-up sessions) or modified treatment program (4 sessions), however in order to ensure approximately equal treatment, only families enrolled in the full treatment program were included in this study. The typical program includes weekly appointments with several of the health care providers, rotating based on the treatment program schedule. Treatment techniques used during the treatment sessions include behaviour modification, nutrition education, physical activity education and continuous medical monitoring by the Clinic’s pediatrician. The health practitioners address topics with patients including food pushers, balance, medical complications, healthy diet (i.e., portion sizes and type of foods), and physical activity (i.e., types, how to schedule into daily activity). The health practitioners aim to help patients self-regulate their own eating and physical activity as well as deal with psychological issues that may be contributing to their weight management difficulties so that they can develop a healthy lifestyle that works for them.

## Results

### *Part 1*

We conducted Pearson bivariate correlation analyses to assess the relationships between body mass index (BMI) and quality of life (physical (PF) and psychosocial functioning (PSF)), child social support for physical activity (SSPA) and healthy eating (SSHE), parent self-efficacy for physical activity (SEPA) and enjoyment of physical activity (EPA) and healthy eating (EHE). The results show that there was a significant negative correlation between BMI and PF,  $r(10) = -.78, p < .01$  (Figure 1), BMI and SSPA,  $r(10) = -.74, p < .01$  (Figure 2), BMI and SSHE,  $r(6) = -.68, p < .05$  (Figure 3), BMI and SEPA,  $r(10) = -.72, p < .01$  (Figure 4), BMI and EPA,  $r(6) = -.62, p < .05$  (Figure 5) and BMI and EHE,  $r(6) = -.57, p < .05$  (Figure 6). Thus, a higher BMI is associated with lower physical functioning, social support, self-efficacy and enjoyment of both physical activity and healthy eating. The correlations were all significant and moderate to strong in strength.

### *Part 2*

We conducted repeated-measures ANOVAs to examine the difference between Time 1 and Time 2 for PF, SS, SE and enjoyment of physical activity and healthy eating. The results indicated that between Time 1 and Time 2 (see Table 1 for means, standard deviations and effect sizes) physical functioning increased,  $F(1,6) = 3.91, p = .095$  (Figure 7). We also found an increase between Time 1 and Time 2 (see Table 1 for means, standard deviations and effect sizes) in parents' self-efficacy for both physical activity  $F(1,6) = 2.99, p = .13$ , (Figure 8) and healthy eating,  $F(1,6) = 3.25, p = .12$  (Figure 9). Enjoyment of eating healthy foods also increased between Time 1 and Time 2 (see Table 1 for means, standard deviations and effect sizes),  $F(1,6) = 4.00, p = .10$  (Figure 10). Although the differences were not significant, most

variables from the hypothesized model increased, producing mostly medium sized effects (Table 1 and Figure 11).

## Discussion

### *Part 1*

We found significant negative correlations between children's BMI and physical functioning, children's perceptions of social support for both physical activity and healthy eating, parents' self-efficacy to get their children physically active and children's enjoyment of physical activity. Thus, children with a higher BMI reported significantly lower physical functioning, social support and enjoyment of healthy behaviours. In addition, parents of children with higher BMIs reported that they have lower self-efficacy to encourage their children to be physically active.

A number of studies have assessed these factors before (eg. Pugliese & Tinsley, 2007; Ingerski, Janicke & Silverstein, 2007; Williams et al., 2005) however, none have assessed them all together as was done in this study. These findings are important because they enhance the understanding of the psychosocial characteristics of a population of obese children. This understanding can help tailor treatment programs to improve these specific factors. Furthermore, a number of studies suggest that improving these psychosocial factors will help improve children's quality of life, and decrease their BMI (Focht et al., 2005; Ingerski et al., 2007; Linde et al., 2006; Pugliese & Tinsley, 2007; Trost, Sirard, Dowda, Pfeiffer & Pate, 2003).

### *Part 2*

In the second part of this study we examined children and parents' psychosocial characteristics at two time points during a multi-disciplinary family-based childhood obesity treatment program. Between Time 1 and Time 2 we observed an increase in the following

variables: physical functioning, parent social support, parent self-efficacy and child's enjoyment of both physical activity and healthy eating. Thus after three months of treatment, children are reporting that they have improved physical functioning and increased enjoyment of health behaviours, and parent's have increased self-efficacy and perceive they provide more social support for their children to engage in health behaviours.

### *Social Support*

After three months of treatment, parents reported that they could provide their children with more social support to be both physically active and to eat healthy foods. These findings are consistent with our hypothesis such that after three months of treatment, parents felt they supported their children more to engage in health behaviours. Numerous studies support this finding (e.g., Igerski et al., 2007; Pugliese & Tinsley, 2007); in addition, the Theory of Planned Behaviour (Ajzen, 1985) suggests that social support plays an essential role in determining an individual's intentions to engage in a behaviour. Furthermore, Courneya, Plotnikoff, Hotz and Birkett (2001) found that social support was essential in helping participants progress through stages of change specifically to become more physically active. Thus, the trend in our data suggests that after three months of treatment in the POC's program, parents report increases in social support, which suggests that this program is heading towards its goal of helping children become more physically active and eat more healthy foods.

### *Parent Self-Efficacy*

Parents reported that after three months of treatment at the POC, they had higher self-efficacy to encourage their children to be physically active and to eat healthy foods. These findings are consistent with our hypothesis that after three months of treatment, parents would report increased self-efficacy to help their children engage in health behaviours. The Theory of

Planned Behaviour (Ajzen, 1985) suggests that self-efficacy influences both an individual's intentions to engage in a behaviour, and their actual tendency to engage in the behaviour. This theory is logical because if an individual perceives that they can control their behaviour to engage in a behaviour, they will be more likely to participate in that behaviour. Thus, if parents perceive that they are able to get their children to be physically active and eat healthy foods, they will likely be more effective in eliciting such behaviours.

### *Attitude*

After three months of treatment, children reported increased enjoyment of eating healthy foods and engaging in physical activity. Although these changes were not significant, they did increase over the study period, which was consistent with our hypotheses. Increased enjoyment is important because attitudes are a central cognitive component in the process of habit formation (Aarts et al., 1997). Thus, if the POC's treatment program can help children incorporate physical activity and healthful eating into their daily routine (i.e., develop habits), it may be doing so by increasing the child's enjoyment of such behaviours. Another study conducted by Ogden et al., (2007) found that while positive or negative attitudes towards a behaviour are important in predicting behaviour change, a stronger predictor of successful health behaviour change is "the absence of a positive attitude to the target (i.e., I no longer find high fat foods appetizing" p. 404). Therefore, although increased enjoyment of eating healthy foods and engaging in physical activity may contribute to these behaviours becoming a habit, it may be more useful in the future to assess children's attitudes to unhealthy foods, which we would hypothesize may decrease throughout treatment.

*Quality of Life*

Finally, consistent with our hypothesis, children reported increased physical functioning after three months of treatment. Although we did not find a significant increase in QOL overall, physical functioning is a component of QOL, which means that the children are reporting an increase in an aspect of their quality of life. Physical functioning may have improved because the physical trainer helped the child to engage in physical activities that were feasible for them. For example, if the child started to ride his or her bike around their neighborhood, after a few weeks they will notice that this activity becomes easier. The Peds-QL would detect this as improved physical functioning through questions such as “In the past month, how much of a problem has it been for you to: walk more than one block, or, do sports activity or exercise?”. Furthermore, with the nutritionist helping the family choose healthier foods, the child would likely have more energy to participate in physical activities. It is promising that we found increases in physical functioning after only three months of treatment because treating obesity requires long term health behaviour changes. Therefore, if these children were assessed again after 6-months or 1-year of treatment, it is hypothesized that greater improvements may be found.

There was a slight decrease in the children’s psychosocial functioning, which may have been due to a number of significant changes in their life during treatment. The families are often dealing with a number of complex issues, in addition to attempting to make difficult behaviour changes. It would be beneficial to examine if psychosocial functioning increased over 6-months or 1-year follow-up as they would have more time to adapt to the life changes.

### *Conclusion*

This study was undertaken to examine the psychosocial factors associated with higher BMIs among children and to assess the efficacy of a multi-disciplinary family-based behavioural obesity treatment program. In general, children with a higher BMI reported that they have lower social support for health behaviours, lower physical functioning and enjoy engaging in health behaviours less. Additionally, parents of children with higher BMIs reported that they have less self-efficacy to get their children to engage in physical activity and eat healthy foods. After three months in treatment, children reported increased physical functioning and enjoyment of health behaviours, and parents reported increased social support and self-efficacy. These findings suggest that the POC's multi-disciplinary family-based behavioural obesity treatment program may be effective in improving psychosocial factors, which previous studies have found lead to increased physical activity, healthy eating and quality of life (Aarts et al., 1997; Pugliese & Tinsley, 2007).

### *Limitations*

One of the limitations in this study was that not all of the questionnaires were not filled out at the beginning of the family's treatment program. Although we may have found a larger difference between Time 1 and Time 2 if we had baseline measurements, we cannot make such a statement without measurements. Second, our sample size was quite small, thus limiting the ability to generalize our results. In future research endeavors, we will aim to recruit a larger sample size.

### *Future Directions*

Further studies should investigate if increased social support, self-efficacy and enjoyment of physical activity and healthy eating play a causal role in improved physical functioning. In

addition, future research might examine if improved physical functioning leads to sustained increased levels of physical activity and healthy eating, and decreased BMI and improved quality of life.

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Table 1  
*Means, Standard Deviations and Effect Sizes for Study Variables*

Variable	<i>M</i> (Time 1)	<i>M</i> (Time 2)	<i>SD</i> (Time 1)	<i>SD</i> (Time 2)	<i>d</i>
Physical Functioning	58.67	70.40	20.08	21.40	0.61
Psychosocial Functioning	68.33	65.24	22.46	22.45	0.15
Quality of Life	65.26	66.88	20.90	20.70	0.08
Parent SS PA	4.71	5.14	1.89	1.35	0.28
Parent SS HE	6.43	6.86	1.40	.90	0.39
Child SS PA	4.67	4.57	2.16	1.90	0.05
Child SS HE	7.00	7.29	1.67	.95	0.23
Parent SE PA	18.29	21.57	5.68	4.47	0.69
Parent SE HE	19.29	21.57	4.42	3.74	0.60
Child SE PA	21.33	23.29	4.59	5.22	0.44
Child SE HE	14.00	16.29	3.41	2.43	0.85
EHE	2.67	3.33	1.03	.82	0.78
EPA	2.67	2.83	1.63	1.60	0.11

Table 2  
*Cronbach's Alpha Scores of Internal Consistency for Study Variables*

Questionnaire	Time 1	Time 2
Peds-QL (Physical Functioning) Child report	.73	.82
Peds-QL (Psychosocial Functioning) Child report	.89	.92
Peds-QL (Quality of Life) Child report	.89	.93
Parent Social Support Physical Activity	.70	.84
Parent Social Support Healthy eating	.84	.71
Child Social Support Physical Activity	.70	.84
Child Social Support Healthy Eating	.94	.11*
Parent Self-efficacy Physical Activity	.92	.88
Parent Self-efficacy Healthy eating	.90	.76
Child Self-efficacy Physical Activity	.52*	.77
Child Self-efficacy Healthy Eating	.70	.34*

Note: Alpha levels were not reported for Enjoyment of Physical Activity or Healthy Eating because these scales only consisted of 1-item. \*Although the alpha levels for these scales were quite low, these data were not used in the analyses.

## Figure Captions

*Figure 1.* Correlation between mean physical functioning and BMI,  $p < .01$ .

*Figure 2.* Correlation between social support for physical activity perceived by the child and BMI,  $p < .01$ .

*Figure 3.* Correlation between social support for healthy eating perceived by the child and BMI,  $p < .01$ .

*Figure 4.* Correlation between parent's self-efficacy to encourage their children to engage in physical activity and BMI,  $p < .05$ .

*Figure 5.* Correlation between enjoyment of physical activity and BMI,  $p < .05$ .

*Figure 6.* Correlation between enjoyment of healthy eating and BMI,  $p < .05$ .

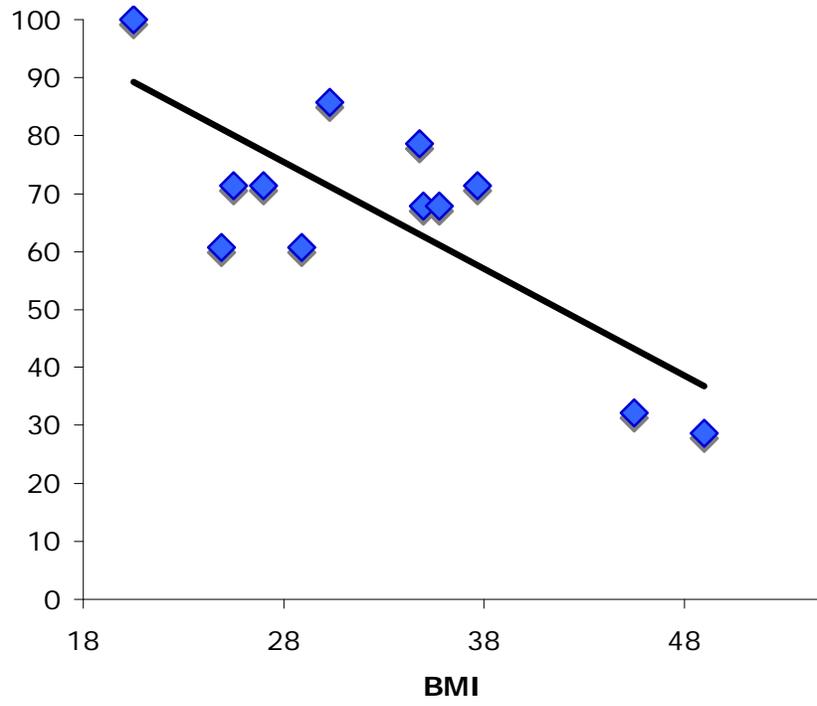
*Figure 7.* Mean physical functioning at Time 1 and Time 2,  $\blacklozenge p < .10$ .

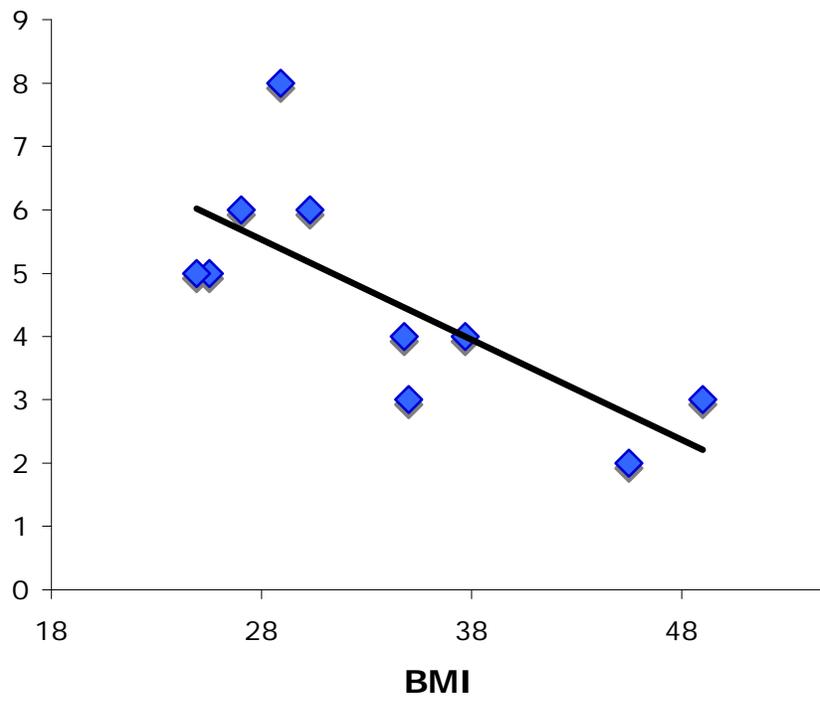
*Figure 8.* Parent self-efficacy physical activity and BMI,  $\blacklozenge p = .13$ .

*Figure 9.* Parent self-efficacy health eating and BMI,  $\blacklozenge p = .12$ .

*Figure 10.* Enjoyment of healthy eating at Time 1 and Time 2,  $\blacklozenge p < .10$ .

*Figure 11.* Mean responses at Time 1 and Time 2.





Effectiveness of Childhoodxxx

