

FAMILY PREDICTORS OF WEIGHT CONTROL BEHAVIORS IN OVERWEIGHT AND  
OBESE YOUTH

By

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As childhood obesity rates rise, more children experience pressure to lose weight. Oftentimes, weight loss attempts are unsupervised by healthcare professionals, leaving families to make their own decisions about which weight control behaviors to use. Unhealthy weight control behaviors are associated with negative consequences such as weight gain and the risk for developing eating disorders. Research shows that overweight and obese children are more likely to engage in unhealthy weight control behaviors when compared to their healthy peers. However, little data exists to help identify children at risk for engaging in unhealthy weight control behaviors. The current study aims are to: (1) describe the use of weight control behaviors in overweight and obese youth through child and parent report. (2) determine if general family functioning and family mealtime interactions are related to the use of unhealthy and healthy weight control behaviors. Participants were 68 overweight or obese youths, ages 10-17, and their parents attending a regularly scheduled clinic appointment. Families filled out questionnaires regarding weight control behaviors, parent-child conflict, family mealtime interactions, and general family functioning. Children who were older and heavier reported increased use of unhealthy weight control behaviors. While general family

functioning was not related to weight control behaviors, children who reported positive family mealtime interactions reported fewer unhealthy weight control behaviors. These data suggest that family interactions specific to mealtime environments are an important factor children's use of unhealthy weight control behaviors. Future research should focus on further identifying which family interaction patterns are related to both healthy and unhealthy weight control behaviors to develop targets for intervention.

## CHAPTER 1 INTRODUCTION

In the United States, pediatric overweight has increased threefold since the 1960's (Crocker & Yanovski, 2009). The most recent studies, including data from 2003-2006, have determined that approximately 31.9% of children and adolescents between the ages of 2 and 19 years old are classified as overweight or obese (body mass index above the 85<sup>th</sup> percentile for age and gender), and 16.3% are classified as obese (body mass index above the 95<sup>th</sup> percentile for age and gender) (Ogden, Carroll & Flegal, 2008). The current trend is especially troubling given that pediatric obesity is associated with a myriad of negative health and psychological consequences. Research continues to show links between pediatric obesity and hypertension and cardiovascular disease (Virdis et al., 2009), metabolic syndrome and non-alcoholic fatty liver disease (Sundaram, Zeitler & Nadeau, 2009), type 2 diabetes (Dabelea et al., 2007), asthma severity (Michelson, Williams, Benjamin, & Barnato, 2009) and musculoskeletal problems (Chan & Chen, 2009). Additionally, children who are overweight are at increased risk for body dissatisfaction (Davison, Markey, & Birch, 2003), peer victimization (Janssen, Craig, Boyce, & Pickett, 2004), and poor quality of life (Janicke et al., 2007; Tsilos et al., 2009).

Given these negative consequences, more children than ever experience pressure to lose weight. As a result, many children and adolescent engage in a wide variety of strategies in an attempt to lose weight or prevent weight gain. Many of the strategies that children utilize to lose or maintain weight are considered "healthy," including activities such as physical activity, eating less high fat foods, and eating more fruits and vegetables. On the other hand, there are a variety of less-than-optimal, or

“unhealthy” weight control strategies used by children. These may include weight control behaviors such as skipping meals, eating very little food, self-induced vomiting, and laxative and diuretic use (Fonseca, Matos, Guerra, & Pedro, 2009). Unfortunately many children are engaging in these weight control behaviors with little input from adults, let alone doctors or nutrition professionals.

Unhealthy weight control behaviors are concerning because they can cause a myriad of negative consequences. First, unhealthy weight control behaviors are associated with weight gain rather than the desired weight loss. In a five-year longitudinal study by Neumark-Sztainer and colleagues (2006), outcomes of adolescent dieting were investigated. Results showed that both boys and girls who engage in unhealthy dieting behavior were three times more likely to be overweight than those who did not engage in dieting. For children who choose to engage in unhealthy weight control behaviors, this weight gain can be especially distressing and may ultimately lead to more desperate and extreme behaviors.

Perhaps most seriously, unhealthy weight control behaviors have been associated with the development of eating disorders. In some cases there is increased risk of developing the binge-purge cycle, which can lead to eating disorders such as bulimia nervosa (Chamay-Weber, Narring, & Michaud, 2005; Neumark-Sztainer, Wall, Story, & Sherwood, 2009). Other studies have shown that unhealthy weight control behaviors can lead to binge eating with loss of control, and ultimately, binge eating disorder (Neumark-Sztainer et al. 2006; Neumark-Sztainer, Wall, Haines, Story, Sherwood, & van den Berg, 2007). With the onset of clinical eating disorders comes additional psychosocial and physical consequences, including affective disorders

(Steinhausen & Weber, 2009) and esophageal and gastrointestinal problems (Zipfel, Sammet, Rapps, Herzog, Herpertz, & Martens, 2006).

Finally, unhealthy weight control behaviors affect other aspects of health.

Adolescents who engage in unhealthy weight control behaviors are at greater risk for poorer nutritional intake, including eating less fruits and vegetables, and not getting enough calcium or fiber (Larson, Neumark-Sztainer, & Story, 2009). Children and adolescents who engage in these weight control behaviors are also at higher risk for engaging in other serious risk taking behaviors such as alcohol use, tobacco use, and premature and unprotected sexual activity (Neumark-Sztainer, Story, Dixon, & Murray, 1998; Pisetsky et. al 2008).

While most adolescents engage in some type of weight control behavior, certain groups are at greater risk. Previous studies have shown that girls engage in more unhealthy weight control behaviors than boys (Linde, Wall, Haines, & Neumark-Sztainer, 2009; Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer, Hannan, Story, & Perry 2004; Neumark-Sztainer, Wall, Guo, Story, Haines, & Eisenberg, 2006;). Regarding race and ethnicity, Caucasian girls are more likely to report unhealthy weight control behaviors than African-American girls, but African-American and Asian boys are more likely to utilize these behaviors than Caucasian boys (Neumark-Sztainer, Croll, Story, Hannan, French, & Perry, 2002). Also, older children report dieting and unhealthy weight control behaviors more than younger children (Neumark-Sztainer & Hannan 2000).

Most notably, overweight and obese adolescents have been shown to engage in more unhealthy weight control behaviors when compared to healthy weight peers

(Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; Fonseca et. al 2009). As many as 40% of overweight and obese girls and 20% of overweight and obese boys have reported using at least one unhealthy weight control behavior (Neumark-Sztainer et al., 2007). Therefore, it stands to reason that investigating the use of weight control behaviors in overweight and obese youth will target the group at highest risk for choosing unhealthy weight control behaviors. More importantly, identifying modifiable variables associated with the use of unhealthy weight control behaviors within this at-risk population is essential to developing safe and effective weight management intervention strategies.

A theoretical model proposed by Neumark-Sztainer and colleagues (2003) has identified several factors associated with the development of unhealthy weight control behaviors based on a body of longitudinal research. Using theories of behavior change and ecological systems, this model tested both proximal personal factors and the distal socioenvironmental factors in which they are embedded. Within the socioenvironmental factors considered, the most important factor was the family environment. This is not surprising as the family system is one of the most important, if not the most important, environment in child development, and aspects of family relationships are related to child outcomes across areas of physical and psychological health. With regards to dietary intake, parents and guardians play a key role since they are responsible for purchasing food, preparing meals, modeling appropriate eating behavior, as well as encouraging appropriate eating through other means (e.g. restriction) (Golan & Weizman, 2001). When parents teach their children appropriate eating and exercising behavior it is often affected by aspects of family functioning and the parent-child

relationship (2001). Beyond the parent-child dyad, other family members also contribute to dietary intake and weight control behavior development. For example, siblings also have a significant impact on eating behaviors by modeling eating, physical activity, and weight loss behaviors.

Only a few studies have examined the relationship between family variables and the use of healthy and unhealthy weight control behaviors in youth. Neumark-Sztainer and colleagues (2003) investigated the role that general family connectedness plays in the development of unhealthy weight control behaviors. They found that as children report more family connectedness, as measured by feelings of positive communication with their primary parent, they also report using fewer unhealthy weight control behaviors (2003). Other studies by this investigative team have replicated this finding (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Fonseca, Ireland, & Resnick, 2002; Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle 2007). In addition, Fonseca, Ireland, and Resnick (2002) examined the association between parental expectations, maternal presence, communication, and extreme dieting behaviors. They found that for boys, high parental expectations and high maternal presence were protective factors for extreme dieting, and in girls, positive communication and high maternal presence were protective factors for extreme dieting (2002). While there have been several identified family variables that serve as protective factors against unhealthy behaviors, family variables associated with an increase in unhealthy weight control behaviors have also been identified in children. Schuetzmann, Richter-Appelt, Schulte-Markwort, and Schimmelmann (2008) found that a poor perceived parent-child relationship as

measured by high conflict, high control, and low confidence was associated with more unhealthy weight control behaviors.

In addition to investigating aspects of general family functioning, much of the research on family variables has focused on family interactions specific to eating behavior. The family mealtime environment has been shown to be one of the most important and dynamic experiences in child and adolescent development. Positive family mealtime interactions are associated with psychosocial well-being (Eisenberg, Olson, Neumark-Sztainer, Story, & Bearinger, 2004), language acquisition and literacy development (Weizman & Snow, 2001), and overall diet quality (Burgess-Champoux et al., 2009; Videon & Manning, 2003). Further, children and adolescents are less likely to be involved in risky behaviors such as tobacco-use, drinking, and early sexual activity (Neumark-Sztainer, Story, & French, 1996). The benefit of family meals is also evident in the development of unhealthy weight control behaviors. Research has shown that increased family mealtime frequency is associated with fewer unhealthy weight control behaviors in children and adolescents (Neumark-Stainer et al., 2007; Neumark-Sztainer et al. 2008; Neumark-Sztainer, Wall, Story, & Sherwood, 2009). Not only is the frequency of family mealtime important, but the quality of interactions during mealtime is also associated with unhealthy weight control behaviors in youth. Neumark-Sztainer and colleagues (2004) found that when families make mealtime a priority and foster positive communication during mealtime children are less likely to engage in unhealthy weight control behaviors. On the other hand, there are eating and diet specific family interactions that have negative consequences as well. Fulkerson and colleagues (2007) found that in a sample of overweight adolescents, family weight-based teasing

and parent encouragement to diet were associated with poor psychosocial health and increased unhealthy weight control behaviors.

While the existing literature provides some evidence suggesting that different aspects of the family environment are associated with, or impact, children's health and unhealthy weight control strategies, there are several significant limitations with the existing literature in this area. The majority of research concerning the role of family in the use of weight control behaviors in youth has been done by one research group who conducted two large epidemiological studies. The Connecticut Youth Survey and Project EAT were designed by collaborators at the University of Minnesota, and they both utilized the same lengthy questionnaire. The questionnaires in these studies often assessed family variables with one or two questions, and there is an absence of well-established family functioning measures used within the literature. Moreover, much of the previous literature focused on very specific aspects of the parent-child dyad, and there have been no studies investigating general functioning of the entire family across dimensions. Children are often impacted by other family relationships, including parental marital relationships and sibling relationships. So it is important to assess the family as a whole, taking into account these other dynamics. Furthermore, there have been few studies or specific analyses that have examined family variables that are associated with the use of unhealthy weight control behaviors specifically in overweight and obese youth. There are also no studies that have investigated parent point-of-view concerning child weight control behavior and family functioning. The parent perspective on child weight control behaviors can inform the literature in several ways. For example, parent report is important if children are not truthful about the taboo behaviors

they engage in. Additionally, the manner in which family functioning affects health behavior can be complex, and parents may offer a different perspective on the interactions between family members. Multiple reporters enable researchers to capture a better picture of how a family is functioning. The goal of the present study is to address these gaps in the literature.

The first aim of the current study is to describe the use of healthy and unhealthy weight control behaviors as reported by children and parents in a clinical sample of overweight and obese youth. In order to ascertain what parents know about their child's behavior, the number of behaviors reported by parents will be compared to the number of behaviors reported by children. Given the sensitive and potentially embarrassing nature of engaging in more extreme weight control behaviors (such as self-induced vomiting), it is likely that children do not disclose their engagement in these behaviors to their parents. Therefore, it is hypothesized that parents will report fewer unhealthy weight control behaviors than their children. It is more likely that children will be open about the healthy weight control behaviors they use, so it is also hypothesized that there will be no significant differences between parent and child reported healthy weight control behaviors.

The study's second aim is to describe the use of weight control behaviors used by overweight and obese youth as they vary by age, gender, and race. Weight control behaviors as they vary by weight status will also be described within this overweight and obese sample. Based on previous findings, it is hypothesized that older children, girls, and Caucasian girls and African-American boys will engage in more unhealthy weight control behaviors. What is more, it is hypothesized that unhealthy weight control

behaviors will increase as weight status increases. This study will also include parent report of weight control behaviors, and therefore the ability to see if these relationships trend in the same way with parents as informants.

The third aim of the study is to investigate the association between general family functioning and weight control behaviors in overweight and obese youth. First, dyadic aspects of the family environment will be investigated by using the Conflict Behavior Questionnaire, a well-established parent and child measures of parent-child conflict, to examine the relationship between parent child conflict and child weight control behaviors. It is hypothesized that as parent-child conflict increases unhealthy weight control behaviors will also increase and healthy weight control behaviors will decrease.

In addition, this study will go beyond dyadic interactions to examine the relationship between child weight control behaviors and the functioning of the entire family unit by using multiple domains of the Family Assessment Device (FAD). The FAD is based on the McMaster Model of Family Functioning, which is a conceptual framework for family functioning that considers six dimensions of family functioning including problem solving, communication, roles, affective responsiveness, affective involvement, and behavior control, as well as total general functioning (Epstein, Baldwin, & Bishop, 1983). Specifically using the FAD, the current study will investigate whether child weight control behaviors are associated with overall family functioning, as well as three other domains of family functioning; affective involvement, problem solving, and communication. Similar to the construct family connectedness measured by Neumark-Sztainer and colleagues (2003) in Project EAT, affective involvement includes items assessing the willingness of family members to be involved in one

another's problems. Problem solving has not been previously studied in relation to weight control behaviors, but it has been indicated as an important protective factor for parenting stress in the management of pediatric obesity (Guilfoyle, Zeller, & Modi, 2010). Finally, it is important to look at the communication of the entire family, especially considering that aspects of parent-child communication (i.e. weight based teasing and encouragement to diet) have been related to weight control behaviors (Fulkerson et al., 2007). It is hypothesized that better family functioning across these domains will be associated with the use of fewer unhealthy behaviors and more healthy weight control behaviors.

The final aim of this study is to examine family mealtime interactions in overweight and obese children as they are associated with weight control behaviors. It is expected that better family functioning within the context of mealtime will be associated with fewer unhealthy weight control behaviors and more healthy weight control behaviors in overweight and obese youth.

## CHAPTER 2 METHODS

### **Participants**

Sixty-eight children between the ages of 10 and 17 years and an accompanying parent or legal guardian were recruited by trained research assistants from a regularly scheduled appointment at a pediatric obesity clinic. The nursing staff at the clinic measured children's height and weight, and only children with a BMI above the 85<sup>th</sup> percentile for age and gender were approached. Individuals who were identified as mentally retarded, as having a psychotic disorder, as being of short stature, or unable to read or speak English were excluded for participating.

### **Procedures**

Trained research assistants approached children and families identified as eligible by the physician of the outpatient clinic. Children provided written assent and parents or legal guardians gave written consent for both their participation and the participation of their child. Both children and parents received a packet of questionnaires, which were completed before and during their clinic visit. Time to complete questionnaires was approximately 30 minutes. Upon completion of the measures, children received a \$5 gift card to a local department store.

### **Measures**

Children completed the following measures:

#### **Weight Control Behavior Checklist.**

The Weight Control Behavior Checklist is a self-report measure that investigates weight control behaviors used in the past year. Children were asked to indicate whether or not they used each behavior. There were six healthy behaviors and ten unhealthy

behaviors listed. Questions were modified from the Project EAT survey, which was developed based on social cognitive theory and with the guidance of a panel of experts (Cronbach's alphas between .69-.77) (Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle, 2007; Neumark-Sztainer, Wall, Story, & Perry, 2003).

**Conflict Behavior Questionnaire (CBQ)-Short Form.**

The CBQ short form (Robin & Foster, 1988) is a 20-item self-report, true/false measure of perceived parent-child conflict within the context of communication and dissatisfaction with interactions. For example, children were asked to rate whether a statement such as "We almost never seem to agree," is true or false. Total scores were then calculated to determine level of conflict, with higher scores indicating higher absence of conflict (i.e. better functioning). This measure has good internal consistency and validity (Robin & Foster, 1988). Children were asked to complete this measure pertaining to the accompanying parent or legal guardian.

**Family Mealtime Interactions Questionnaire for Children.**

This 10-item self-report measure of family mealtime interactions included family mealtime items from the Project EAT survey (Fulkerson, Neumark-Sztainer, & Story 2006). The measure consisted of a 4-point Likert scale, and children indicated how strongly they agree with each statement (strongly disagree, disagree, agree, strongly agree). An example statement is, "In my family dinner time is about more than just eating food, we all talk to each other." A total mealtime interaction score was calculated by summing the items. Higher scores indicated more positive family mealtime interactions.

## **Height and Weight.**

Children had their height in meters and weight in kilograms measured by the nursing staff at the clinics. These data were used to calculate BMI ( $\text{kg}/\text{m}^2$ ). BMI z-score values were then calculated for children using age in months, gender-specific median, standard deviation, and the Box-Cox transformation according to Center for Disease Control national norms (Kuczmarski et al., 2002).

Parents or legal guardians completed the following measures:

### **Family Assessment Device (FAD).**

Parents completed the FAD (Epstein, Baldwin, & Bishop, 1983) to assess family functioning. The FAD is a 60-item measure, which assesses seven dimensions of whole family functioning. Dimensions were assessed via seven subscales of the FAD; problem solving, communication, roles, affective responsiveness, affective involvement, behavior control, and general functioning. General functioning, affective involvement, problem solving, and communication were used in the present study. Each statement on the FAD is answered on a Likert scale that requires the respondent to indicate whether he or she agrees or disagrees (1 = strongly agree to 4 = strongly disagree). Items from each subscale were totaled, with higher scores indicating poorer functioning on each scale. The FAD is considered a well-established measure of family functioning with Cronbach's alphas on subscales that range from .72 to .92 (Alderfer et al., 2008).

### **Weight Control Behavior Checklist (Parent Report).**

The parent version of the Weight Control Behavior Checklist is a 16-item measure that requires parents and legal guardians to provide information regarding child weight loss practices. The questions used on this measure are consistent with those used on the child self-report version.

### **Conflict Behavior Questionnaire (CBQ-short form) (Parent Report).**

The parent report version of the CBQ (Robin & Foster, 1988) is a 20-item self-report, true/false measure of parent-child conflict. An example statement includes, "My child and I compromise during arguments." Items were added to produce a total conflict score. Higher scores indicate greater absence of conflict (i.e. better functioning).

### **Demographic Questionnaire.**

Parents and guardians completed a 12-item questionnaire which assessed self-reported family background information such as: age, gender, parent and child race, parent marital status, parent and child education, and family income.

### **Data Analysis**

In order to characterize the sample, descriptive statistics (means, SDs) were calculated for demographic variables, amount of unhealthy weight control behaviors by children and parents, and amount of healthy weight control behaviors reported by children and parents. Next, independent samples t-tests were calculated to investigate whether parent reported weight-control behaviors and child reported weight control behaviors were significantly different. Independent samples t-tests were also conducted to determine differences in weight control behaviors between males and females for both parent and child report. ANOVA was used to determine if there were any differences in weight control behaviors among races. Correlation analyses were then used to examine the relationship between personal characteristics (age and weight status), and child and parent reported healthy and unhealthy weight control behaviors. Next, the association among family variables and weight control behaviors were assessed. Multiple regressions were conducted for each of the four outcome variables: child-reported unhealthy weight control behaviors, child-reported healthy weight control

behaviors, parent-reported unhealthy weight control behaviors, parent-reported healthy weight control behaviors. Demographic and weight status variables that were correlated with weight control behaviors were entered in block 1, while family variables from the FAD, CBQ, and Family Mealtime Questionnaire were entered in block 2.

## CHAPTER 3 RESULTS

A total of 68 children (35 females, 33 males) between the ages of 10 and 17 years (mean age = 13.06, SD=2.07) completed the study. More than half of the respondents were Caucasian and approximately one quarter were African American. The majority of parents/guardians who completed the study were mothers. Overall, this was a relatively low income sample with a median range of family income between \$20,000-\$39,999. The sample was also mostly obese, with fewer children falling in the overweight category. Demographic information is displayed in Table 1.

The first aim of the study was to describe the use of both healthy and unhealthy weight control behaviors as reported by children and their parents or legal guardians. An additional aim was to determine if there were differences in child-reported and parent-reported behaviors. Results from the Weight Control Behavior Checklist showed that 97% of children and 94% of parents reported that children use at least one healthy weight control behavior, while 73.1% of children and 69.1% of parents reported that children engaged in at least one unhealthy weight control behavior. Moreover, 62.7% of children and 50% of parents reported that children engaged in two or more unhealthy weight control behaviors. On average children reported using 2 out of possible 10 unhealthy weight control behaviors (SD=1.64) and 5 out of a possible 6 healthy weight control behaviors (SD=1.36). Their parents reported in a similar pattern (mean unhealthy weight control behaviors=1.7, SD=1.53; mean healthy weight control behaviors=4.57, SD=1.75). T-tests were conducted in order to determine if there were significant differences between parent and child report of both healthy and unhealthy weight control behaviors. Results showed that there was no significant difference

between the number of *unhealthy weight control behaviors* reported by parents and children [ $t(66)= 1.827, p=.072$ ]. There was a significant difference between the number of *parent-reported healthy weight control behaviors and child-reported healthy behaviors* [ $t(64)=2.016, p<.05$ ], with children reporting the use of more healthy weight control behaviors compared to what parents reported about their children.

Children's most frequently endorsed unhealthy weight control behaviors were skipped meals, ate very little food, skipped breakfast, and used a food substitute. Parents' reporting was consistent with child report. All of the healthy weight control behaviors were endorsed by more than 60% of the sample. Children's most frequently endorsed healthy weight control behaviors were exercised, drank more water, and drank less soda. Parents again reported in a similar pattern. Results can be seen in Table 2.

The second aim of the study was to determine if weight control behaviors vary by gender, race, age, and weight status in this overweight and obese sample (see Table 3). T-tests showed that there were no significant differences by gender in reported healthy and unhealthy weight control behaviors. This was consistent with both parent and child report. One-way ANOVA's showed there were also no significant differences by race in reported weight control behaviors. Finally, bivariate correlations examined the relationship between weight control behaviors and age and BMI z-score. With regards to child report, older children ( $r=.269, p<.05$ ) and children of higher weight status ( $r=.358, p<.01$ ) used more unhealthy weight control behaviors. Therefore, age and BMI z-score were entered as covariates in the subsequent child-report unhealthy weight control behavior multiple regression. This relationship was not found in parent

report of unhealthy weight control behaviors. Also, age and weight status were not correlated with child or parent report of healthy weight control behaviors.

The third aim of the study was to determine if general family functioning, affective involvement, problem solving, and communication (as measured by the FAD) and parent-child conflict (as measured by the parent and child report CBQ) were related to the use of weight control behaviors in overweight and obese youth. Table 4 shows the sample's means and standard deviations for the composites of the four subscales of the FAD and the CBQ (both parent and child report),

Additionally, the fourth aim of the study was to determine if more specific family mealtime interactions (as measured by the Family Mealtime Interactions Questionnaire) were related to the use of weight control behaviors in overweight and obese youth.

Table 4 also shows the sample's means and standard deviations for the Family Mealtime Interactions Questionnaire.

To examine these aims, multiple regressions were conducted on each of the four dependent variables. The model for child-reported healthy weight control behaviors was not significant ( $F(7,46)=1.359, p=.254$ ) (see Table 5). The overall model for child-reported unhealthy weight control behaviors was significant ( $F(7,46)=3.154, p=.005$ ). The regression indicated that as family mealtime interactions total score increased, child-reported unhealthy weight control behaviors significantly decreased, and family mealtime interactions explained approximately 14% of the variance in child-reported

unhealthy weight control behaviors (see Table 6). The models for parent-reported healthy behaviors ( $F(7,47)=.617$ ,  $p=.739$ ) and parent-reported unhealthy behaviors ( $F(7,48)=2.082$ ,  $p=.064$ ) were both not significant (see Tables 7 and 8). Of note, the model for parent-reported unhealthy behaviors was approaching significance, and the family mealtime interactions variable was significant such that as family mealtimes got better, parent-reported unhealthy weight control behaviors decreased. In this model, family mealtime interactions explained approximately 19% of the variance in parent-reported unhealthy weight control behaviors.

Table 3-1. Demographic characteristics of the sample.

	Mean	SD
Child Age	13.06	2.07
BMI z-score	2.29	.50
<hr/>		
		%
Gender		
	Boys	48.5
	Girls	51.5
Child Race		
	Caucasian	51.5
	African-American	29.4
	Hispanic	10.3
	Asian	0
	Other	4.4
	Not Reported	4.4
Guardian Relationship		
	Mother	82.4
	Father	4.4
	Step-Mother	7.4
	Step-Father	1.5
	Grandparent	4.4
Median Family Income		
	Below \$9,999	17.6
	\$10,000-\$19,999	19.1
	\$20,000-\$39,999	35.3
	\$40,000-\$59,000	11.8
	\$60,000-\$79,999	7.4
	Over \$80,000	7.4

Table 3-2. Child and parent report of weight control behaviors

	% Child report	% Parent report
<b>Healthy weight control behaviors</b>		
Ate less high fat food	80.9	69.1
Exercised	89.7	83.8
Ate more fruits and vegetables	79.4	76.5
Drank more water	88.2	79.4
Ate fewer sweets	75.0	72.1
Drank less soda	83.8	72.1
<b>Unhealthy weight control behaviors</b>		
Skipped meals	47.1	47.1
Ate very little food	47.1	38.2
Took diet pills	7.4	5.9
Self-induced vomiting	1.5	1.5
Fasted	19.1	13.2
Used a laxative	10.3	8.8
Smoked cigarettes	0	0
Used a food substitute	27.9	22.1
Used diuretics	1.5	1.5
Skipped breakfast	42.6	32.4

Table 3-3. Associations of gender and race with weight control behaviors

	t	df	P
<b>Gender</b>			
Child report UWCB	-.293	65	.770
Parent report UWCB	-1.155	66	.252
Child report HWCB	-.541	64	.590
Parent report HWCB	.021	64	.983
	F	df	P
<b>Race</b>			
Child report UWCB	1.534	3, 60	.215
Parent report UWCB	1.333	3, 61	.272
Child report HWCB	.371	3, 59	.775
Parent report HWCB	2.640	3, 61	.058

Table 3-4. Report of family functioning, parent-child conflict, and family mealtime interactions

	Mean	SD	Range
Family Assessment Device (Parent Report)			
General Family Functioning	1.74	0.43	1.0-4.0
Problem Solving	1.9	0.46	1.0-4.0
Communication	1.95	0.42	1.0-4.0
Affective Involvement	2.05	0.44	1.0-4.0
Conflict Behavior Questionnaire (Child Report)b	34.63	5.47	20.0-40.0
Conflict Behavior Questionnaire (Parent Report)b	35.14	4.8	20.0-40.0
Family Mealtime Questionnaire (Child Report)c	30.83	4.75	10.0-40.0

a Higher scores indicate poorer functioning

b Higher scores indicate larger absence of conflict

c Higher scores indicate better family mealtime interactions

Table 3-5. Family variables in relation to child-reported healthy weight control behaviors

	B	SE B	$\beta$
Constant	4.532	2.543	
FAD general functioning	.021	.080	.086
FAD problem solving	-.103	.109	-.235
FAD communication	.033	.082	.098
FAD affective involvement	-.037	.072	-.085
CBQ Child-report	.029	.044	.122
CBQ Parent-report	-.073	.042	-.263
Mealtime Interaction	.090	.053	.323

\*p<.05, \*\*p<.01

Table 3-6. Family variables in relation to child-reported unhealthy weight control behaviors

	B	SE B	$\beta$
<b>Step 1</b>			
Constant	-2.578	1.436	
BMIz	.179	.095	.235
Child's Age	.993	.375	.331
<b>Step 2</b>			
Constant	2.775	3.240	
BMIz	.069	.101	.091
Child's Age	1.099	.371	.366
FAD general functioning	.030	.086	.100
FAD problem solving	-.207	.122	-.382
FAD communication	.019	.092	.045
FAD affective involvement	.029	.081	.055
CBQ Child-report	.008	.049	.026
CBQ Parent-report	.016	.047	.045
Mealtime Interaction	-.130	.061	-.378*

\*p<.05, \*\*p<.01, ΔR<sup>2</sup>=.202

Table 3-7. Family variables in relation to parent-reported healthy weight control behaviors

	B	SE B	$\beta$
Constant	.776	3.538	
FAD general functioning	.159	.110	.482
FAD problem solving	-.238	.149	-.414
FAD communication	.036	.114	.082
FAD affective involvement	-.111	.100	-.194
CBQ Child-report	.056	.061	.174
CBQ Parent-report	.019	.059	.052
Mealtime Interaction	.053	.073	.144

\*p<.05, \*\*p<.01

Table 3-8. Family variables in relation to parent-reported unhealthy weight control behaviors

	B	SE B	$\beta$
Constant	4.090	3.018	
FAD general functioning	-.116	.092	-.377
FAD problem solving	-.078	.127	-.143
FAD communication	.096	.097	.231
FAD affective involvement	.127	.085	.241
CBQ Child-report	.009	.052	.030
CBQ Parent-report	.049	.051	.142
Mealtime Interaction	-.151	.063	-.436*

\*p<.05, \*\*p<.01

## CHAPTER 4 DISCUSSION

Children who are overweight or obese are at elevated risk for engaging in unhealthy weight control behaviors, so determining risk factors and protective factors is essential in developing effective interventions. Family variables have been shown to have a significant impact on health behaviors and psychosocial functioning in children with a variety of chronic health conditions (Alderfer, Navsaria, & Kazak, 2009; Mitchell, Powers, Byars, Dickstein, & Stark, 2004; Patton et al., 2009). Unfortunately, there are only a few studies that have examined the association between family variables and the use of unhealthy weight control behaviors in youth in general, let alone overweight and obese youth (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Fonseca, Ireland, & Resnick, 2002; Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle, 2007). Given the impact that the family can have on health behaviors (Burgess-Champoux et al., 2009; Golan & Weizman, 2001; Videon & Manning, 2003), there is a pressing need for greater research in this area. This study extends the literature in this area by incorporating a broader, well-established measure of family functioning, examining both parent and child report of child use of weight control behaviors, and focusing strictly on an at-risk population of youth who are overweight or obese.

It is important to put the results of this study within the context of the sample. The participants were recruited from a pediatric obesity clinic, and average BMI z-scores were consistent with an average weight status in the obese to morbidly obese range. While there was restricted range in weight status, there was relatively good variation across other demographic variables. The sample was ethnically diverse, and there was an even split between boys and girls across ages.

Both children and parents reported that the child participants in this study used a higher percentage of healthy weight control behaviors than unhealthy weight control behaviors. In fact, the majority of children (97%) and parents (94%) reported that the children are utilizing healthy behaviors, such as exercise, eating more fruits and vegetables, and drinking less soda and more water, to lose or maintain weight. With so much information on weight loss available via the internet, print media, and television, it is encouraging that many children are choosing healthy means of weight maintenance. On the other hand, 73.1% of children and 69.1% of parents reported that children engaged in at least one unhealthy weight control behavior, while 62.7% of children and 50% of parents reported that children engaged in two or more unhealthy weight control behaviors. These findings are consistent with those reported by Neumark-Sztainer and colleagues (2002), wherein 68% of overweight girls and 42% of overweight boys reported using unhealthy behaviors, compared to 95% of overweight girls and 83% of overweight boys who reported engaging in at least one healthy weight control behavior.

Of the unhealthy weight control behaviors, the less extreme behaviors were endorsed more frequently (by up to 50% of the sample) by parents and children than more extreme weight control behaviors. This data is also consistent with the findings of previous studies (Neumark-Sztainer & Hannan, 2000). Less extreme unhealthy weight control behaviors such as skipping meals (especially breakfast), eating very little food, and using a food substitute were endorsed by one quarter to one half of the sample. Those unhealthy weight control behaviors that are typically considered more extreme weight control behaviors (i.e., self-induced vomiting, cigarette smoking, diuretic use, diet pill use, and laxative use) were endorsed by less than or equal to 10% of the sample. It

is understandable how children and parents may think that engaging in such behaviors would enable them to achieve their weight loss goals with little to no side effects. However, even these less extreme behaviors have shown to be ineffective (Boutelle, Libbey, Neumark-Sztainer, & Story, 2009) and may actually lead to weight gain. Moreover, research shows that using less extreme weight control behaviors often leads to utilizing more extreme weight control behaviors later on (Neumark-Sztainer, Wall, Guo, Story, Haines, & Eisenerg, 2006). Therefore, the findings that almost 50% of the sample report using such behaviors supports the need for an increase in nutrition and weight loss education.

Overall, older children and children with a higher weight status reported using more unhealthy weight control behaviors. These results are consistent with the literature (Boutelle, Neumark-Sztainer, Story, & Resnick, 2002; Fonseca et. al 2009; Neumark-Sztainer & Hannan, 2000). The relationship between weight status and unhealthy weight control behaviors is particularly robust even in our restricted range of BMI z-scores. Differences in unhealthy weight control behaviors have been previously reported in comparisons between overweight versus obese youth (Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002). The results of this study supports this finding by describing a linear trend in the relationship between weight status and unhealthy weight control behaviors that continues into weight status above the 95<sup>th</sup> percentile. This has implications for intervention in that not all children in the overweight and obese range have the same risk, but children in the obese to morbid obese range are at greater risk. It is possible that these children are not seeing noticeable changes in weight status by using healthy weight control behaviors, and they may receive additional pressure to

make changes from parents and doctors, so they engage in unhealthy weight control behaviors in hopes of finding a quicker fix.

It was surprising to find that there were no gender or race differences noted in the use of healthy or unhealthy behaviors. It has consistently been shown that more girls utilize unhealthy weight control behaviors than boys (Linde, Wall, Haines, & Neumark-Sztainer, 2009; Neumark-Sztainer & Hannan, 2000; Neumark-Sztainer, Hannan, Story, & Perry 2004; Neumark-Sztainer, Wall, Guo, Story, Haines, & Eisenberg, 2006), but given this is a primarily obese sample, it may be that gender difference becomes less apparent as weight status increases.

This study is the first to include both child- and parent-report of youth weight control behaviors. Contrary to what was hypothesized, there was no difference between parent and child report of unhealthy weight control behaviors. There are two possible explanations for the finding. First, it may be that parents are aware of the unhealthy weight control behaviors their children engage in. This may be because children are disclosing their behaviors to their parents, or it may be that parents are observing their children's behavior with or without their children's knowledge. Alternatively, it may be that the youth in this study underreported the use of these unhealthy weight control behaviors, possibly due to embarrassment or fear of reprimand. In either case, it will be important in future research to discern if: 1) parents know the risks associated with these behaviors, 2) parents model these behaviors, and 3) parents in some way overtly or covertly encourage these behaviors.

Regarding healthy behaviors, parents reported that their children are engaging in significantly fewer healthy behaviors compared to what the children themselves

reported. This was not expected. One explanation may be that parents are not aware of their children's healthy behaviors overall, again either because children do not tell their parents about their efforts or their parents are not observing noticeable behaviors. In addition, parents may just assume that because their child is obese, they are not engaging in healthy weight control behaviors. On the other hand, it may be that parents are aware of their child's healthy eating and exercise behaviors, but they have different expectations about how often one should engage in a healthy behavior in order to lose or maintain weight. It is important to keep in mind that the children in this sample were recruited from an obesity clinic. So, they may have increased pressure to lose weight, may not be seeing desired changes, and their parents may be expecting more effort from them. Another explanation for the difference between parent and child report may be social desirability bias from children. It is possible that children may have reported engaging in more healthy behaviors than they actually engage in, and parent report was actually more accurate. The potential bias here would be in the opposite direction relative to the potential bias for youth to underreport unhealthy weight control behaviors. Certainly future longitudinal research in this area is needed to replicate these results and clarify the potential mechanisms of effect.

This study supports family functioning during mealtime as a potential protective factor for unhealthy weight control behaviors in overweight and obese youth. Positive family mealtime interactions were associated with fewer child- and parent-reported unhealthy weight control behaviors, which is consistent with previous research that examined child report of unhealthy weight control behaviors (Neumark-Sztainer et al., 2004). As this study is cross-sectional, the direction of the relationship cannot be

determined, and it may be bidirectional such that weight control behaviors both affect and are affected by family functioning at mealtime. For example, children who feel intense pressure to lose weight may engage in unhealthy weight control behaviors (such as extreme calorie reduction) to compensate and then feel frustration concerning eating expectations during mealtime. On the other hand, children who are victims of weight-based teasing during mealtime may then engage in unhealthy weight control behaviors as a quick fix, which may lead to conflict about eating behaviors during mealtime. In a longitudinal study of family meal frequency, more frequent family meals at time 1 were associated with fewer unhealthy weight control behaviors in girls at time 2, five years later (Neumark-Sztainer, Eisenberg, Fulkerson, Story, & Larson 2008), which supports the theory of a protective and preventive nature of family mealtime in youth. The results from the current study highlight the importance of conducting longitudinal research including the family mealtime, with a particular emphasis on the quality of family interactions and family functioning, not just frequency of shared family meals. It will be especially necessary to consider the interaction between mealtime family functioning and frequency of shared meals, as it is possible that frequent, negative family meals may increase harmful practices rather than protect against them.

Regarding general family variables, the findings are less clear. Previous research has shown a link between general family variables (such as parent-child connectedness, parental expectations, and parental monitoring) and the use of unhealthy weight control behaviors in youth (Ackard, Neumark-Sztainer, Story, & Perry, 2006; Fonseca, Ireland, & Resnick, 2002; Fulkerson, Strauss, Neumark-Sztainer, Story, & Boutelle 2007). In this study, family unit variables, including general family

functioning, communication, affective involvement, and problem solving, were not related to weight control behaviors. Also, dyadic measures of parent-child conflict were not related to weight control behaviors. While it may be that the variables measured in the current study have no ecological association with weight control behaviors in overweight and obese youth, there are also methodological considerations. Prior research on family variables and weight control behaviors included studies with very large sample sizes ( $n=350$ -9,000 children), and therefore the ability to utilize multivariate data analyses (Fonseca, Ireland, & Resnick, 2002; Schuetzmann et al., 2009). The current study was limited by sample size and univariate analyses. With that in mind, general family functioning variables should continue to be investigated as they relate to weight control behaviors.

This study had several limitations, which must be addressed. First, as noted above there was a relatively small sample size, which limited the power to detect relationships in the analyses. The relationship between mealtime interactions and parent-reported unhealthy weight control behaviors consisted of a significant beta-weight ( $\beta = -.436$ ,  $p < .05$ ) within the model, but the model itself was not significant. It is possible that with more participants the whole model would be significant. The relationship between family variables and weight maintenance was investigated with a focus on overweight and obese youth. That being said, there was no comparison group to determine if these processes are different in healthy weight versus overweight and obese youth. And as previously mentioned, measures of both weight control behaviors and family variables were self-report, and thus influenced by social desirability bias. It is reasonable to assume that unhealthy weight control behaviors (especially the more

extreme behaviors) were under-reported, while healthy weight control behaviors were over-reported. Finally, the study sample consisted of children whose BMI was above the 85<sup>th</sup> percentile for age and gender. However, the majority of the sample was actually above the 95<sup>th</sup> percentile, which restricted the range, making it more difficult to detect differences. It also limits generalizability to all overweight and obese children.

This study highlights several areas in which to continue to investigate weight control behaviors in overweight and obese youth. First, there is a paucity of research focusing on the weight control behaviors of morbidly obese youth. The results of this study highlighted that, even within a restricted range, differences exist. It is important to continue to investigate how weight status plays a role in weight control behavior use, especially within the most at-risk population. More importantly, investigating the interactions between weight status and family variables will inform researchers how best to develop obesity interventions targeting different weight groups.

There is some indication that parents are generally aware of the behaviors their children engage in. However, the understanding of overall point-of-view of parents regarding weight control behavior is limited. Little is known regarding what parents know about the risks and benefits of healthy and unhealthy behavior. It is also unknown whether they model or encourage their children to engage in these behaviors. Finally, it is important to consider what parent expectations are for weight loss behavior as they relate to weight loss goals. Future research on weight control behaviors in youth should include more parent measures to better understand their role in weight control behavior development.

Overall, the literature supports the importance of general family functioning variables as being important in the development of weight control behaviors, but this area is just beginning to be investigated. Previous research has largely focused on the parent-child dyad from the child perspective, and there are many other aspects of family functioning that should be addressed. This study moved the literature forward by being the first to include well-established measures of family unit functioning. It was also the first study to include parent-report measures of family functioning. Future research should investigate other aspects of family functioning, such as sibling dyads and marital relationships, and it should consider other methods of assessment, such as observational measures or other third-party reporters to protect against potential biases.

Family mealtimes have already been established as an important component of childhood development, and this study indicates that it is important in weight control behavior development as well. Therefore, it is necessary to continue to investigate the family mealtime role by expanding into both longitudinal and observational studies. As previously discussed, longitudinal studies of mealtime frequency have supported the family mealtime's protective effects against unhealthy weight control behaviors (Neumark-Sztainer et al., 2008). Investigating the functioning of family mealtimes in a longitudinal design is essential in determining how the mealtime environment affects health behavior. It is also essential that family mealtime interactions be studied systematically through observation means. One such methodology is the Mealtime Family Interactions Coding System (MICS) (Dickstein, Heyden, Schiller, Seifer, & San Antonio, 1994). This coding system has been used to study the mealtime interactions in families with children with obesity (Moens, Braet, & Soetens, 2006), type 1 diabetes

(Patton, Piazza-Waggoner, Modi, Dolan, & Powers, 2009), and cystic fibrosis (Janicke, Mitchell, & Stark, 2005), and it has moderate test-retest reliability (Mitchell, Piazza-Waggoner, Modi, & Janicke, 2009). By expanding research in these areas, the specific components of the mealtime can be delineated.

Finally, the main purpose of identifying family risk and protective factors in weight control behaviors is to aid in the development of intervention. The prevalence of unhealthy weight control behaviors highlights the importance of education, and future research should investigate the effectiveness of strategies used to inform children about the risks of using unhealthy weight control behaviors versus choosing healthy weight control behaviors. Also, modern pediatric obesity interventions often involve family groups, especially with the parent as the agent of change. Therefore, family-based obesity interventions are an appropriate avenue for addressing family functioning both in general and in the context of mealtime. It will be important to assess the impact that intervening in family relationships has on how children choose to manage their weight.

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## BIOGRAPHICAL SKETCH

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